COAL AGE

VOL. 3 NEW YORK, JUNE 21, 1913 No. 25

"To work hard, live hard, die hard and go to hell after all is hard indeed." Here we have expressed in few words the creed of the average miner. When we say this we do not wish to infer that this creed is peculiar to mining folk, it was framed long before civilization had need of the miner; in truth it is the creed of the "under dog" in all walks and occupations and probably has been since "under dogs" became necessary to the scheme of things mundane.

The peculiar thing about this creed, however, is that so few of those who have to deal with these self-styled "under dogs" are aware of its existence.

The state of mind produced by the blind acceptance of such a creed is responsible for many of the mysterious actions observed in those who profess allegiance to it. A little serious consideration of its effect on the average human being might eliminate many of the endless misunderstandings between employee and employer.

Reducing this down to words of "two syllables" here's an example:

A miner goes to a check window to draw a check; the clerk recognizes him as one who never has time ahead and promptly turns him down without taking the trouble to investigate (that's what the clerk would describe as "doing a thing on general principles"). The miner realizes that he has not been given a square deal; never having been taught that the best way to get a thing out of one's system is to run it down immediately and get rid of it, he accepts the clerk's "slap" as a thing to be expected and nurses a grudge. It has never occurred to him that possibly his employer desired that all men be given fair treatment; his creed assures him that his lot must be hard and hard he finds it.

That clerk won't always have the "whip hand." As a matter of fact when conditions become strained this miner will be one of the most enthusiastic agitators for a "strike with no quarter" and if opportunity is presented he'll make an end of that Mr. Clerk and no one will be able to explain the motive.

Of course, a conscientious boss will assure himself that he is giving his men a square deal as he can easily do. Then if the men themselves weigh and consider they will always agree with him, even though some of the under bosses, in the exercise of a little brief authority, do conduct themselves provokingly.

But until a great change is manifested in that part of the human make-up popularly known as "human nature," you must not expect men to weigh and consider. It will not do to let grudges develop and fester; you must actively exhibit some concern in the welfare of the discontented; otherwise the one vial of grievance will poison all your copious springs of good will.

Not less important than generous dealing is that spirit of friendship which destroys suspicion and supplies the key to the motives which actuate us.

When the sure-enough strike with all its enmities and misconstruction is upon us, we shall never regret that we have tried to make our manners as benign as our acts.

IDEAS AND SUGGESTIONS

Technical Language in Educational Writings

By M. E. Wadsworth*

Apparently one of the most important factors in mining education is to bridge the chasm between the uneducated and the educated mining man; and stimulate and encourage the former to undertake the necessary drudgery to acquire more or less education, at least in his chosen work. The term "practical mining man" is one that seems to be greatly abused and misused, as the educated mine expert is often as practical or even more so than the uneducated miner.

There is a common misapprehension among men uneducated in any special study, that papers upon the subject can be readily written so that they will be easily understood by those who have given it no consideration. While this simplifying process may be and ought to be applied to a greater or less extent in textbook writing. it seems to be difficult if not impossible to do so within the limits of an article prepared for a journal. As the object of a textbook is to start upon the level of the student, for whom it is designed, and to lead him up to a higher plane of knowledge, care should be taken in it to begin at the proper point, and to define and render clear every technical term and every step of the way; so that the science and its principles can be easily understood by the attentive reader. The mental discipline should be provided by the practical application of the principles and not through difficulties placed in the way of understanding those fundamentals by an obscurity of language.

It must be acknowledged, however, that the vast majority of our textbooks fail in not being adapted to the use of the persons for whom they are supposed to have been written. The uneducated mining man has a right to complain in regard to the teaching afforded by the average textbook.

While the technical language of any subject is difficult to comprehend for one unlearned in that study, it seems, as before said, impracticable for any special journal article to be written in untechnical language, unless the writer uses an excessive number of words.

Technical terms are the shorthand of scientific language that allow one, in a few words, to save many pages of untechnical writing. In fact, to the scientificially trained man, these terms are the common everyday language in which he thinks, and they are perfectly simple and clear to him. In truth, in most cases, it seems impossible for him to use different language.

All men in every walk of life employ special (technical) terms suited to the occupation they follow. All have to use that language to a greater or less extent, and when anyone desires to be at all versed in, or to understand, any subject, he must become the master of its technical language. The miner, the farmer, the baker, the brewer, the hunter, the fisherman, the printer, the merchant, the dressmaker, the milliner, and the housewife all have and use their technical phrases, which it is necessary for others to know, if they wish to talk with them understandingly upon their chosen subjects.

Even the domestic animals know to a greater or less extent some of this technical language. If this is doubted let one who has never been in a mine try to drive a mine mule, or one equally ignorant of the special language employed endeavor to guide an ox team, a cab-, coach- or race-horse, or manage a hunting dog. The street urchin, the school child, the cowboy, the burglar, sneak thief, the pickpocket, as well as the banker, lawyer, doctor, geologist and engineer all have their distinctive technical language, and, if we are to converse intelligently with them in their specialties, we must instruct ourselves in it.

Slang is technical language in which a word or a sentence conveys to the initiated that which it would take a tedious description to express—hence, however much we may frown upon it, it will ever be in popular but changing use. Even the miners themselves use different special terms in their work; for example, the coal miner and the metal miner, the German and the English miner, the Cornishman and the Australian, New Zealand and South African mining man.

Who is there who would understand a report of a game of baseball or football, if it were reported in common untechnical language or what journal would print it? Yet it is as just to ask that the language of our athletic sports shall be translated into the venacular, as to demand that mining language shall be. To bring this about, the uneducated miner would have to change the world, as his language is as obscure to others as that of the most abstruse mining article is to him.

That all writings for general or for class teaching should be made as simple as possible is a truism, but it is as necessary for the uneducated mining man to educate himself up to the standard of others as it is for the learned writer to forsake that which has become to him as his mother tongue, and use language that he has long ago forgotten; and which usually has so many different shades of meaning that it cannot convey a clear and positive technical idea. Neither class of mining men should despise the other, but both should strive to approach each other as far as practicable and become mutually helpful.

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The Evolution of the Mine Foreman

By a Pennsylvania Engineer

The mine foreman, though employed by the mine operator, has a double service to perform, his duty to the operator and his duty to the state; these services are often in apparent or actual conflict. He serves, in effect, as both mine foreman and deputy inspector. It is almost an axiom of government that such dual service should

never be imposed on one man. There should be, therefore, at every operation, sufficiently large to justify it, two men—a mine foreman and a deputy inspector.

It is observable that the tendency of mining legislation is to place on the mine foreman a larger and larger burden of responsibility for the safety of the mine. Not only must he see that the miner is safeguarded against the hazards incident to machinery, but also he must guard him against his own misjudgment and neglect, by constant visits, inspection and counsel.

There has been no law passed compelling a woods-foreman to visit his woodsmen and to see that they use due care in handling their axes and in regulating the direction in which trees are felled so as to avoid personal injury. True, it is the duty of the company to provide safety appliances around the saws and boilers, but the absence of the mill foreman from the mill temporarily or all the time, and his omitted counsel would not subject him to reprimand and to the equivalent of dismissal or legal incapacitation for reëngagement, should any employee be hurt through some misjudgment. In fact, there is no requirement that any mill or woods-foreman should be engaged. The owner himself is the responsible party.

Mining legislation is more completely developed along paternalistic lines than any other. The larger corporations are not inclined to regard this as a disadvantage, rather adding to, than attempting to evade the requirements of the drastic laws. The main objection to such legislation is that smaller corporations are prone to seek every means of evasion rather than to fulfill the obligation of the law. In such cases, on the mine foreman rests the brunt of this fatherly law making.

He is not disposed to carp at the provision for close inspection. The ignorance of some miners, many of them aliens, nearly all of them reared in other occupations, whose mutual dependence on one another against a multiplicity of hidden dangers, the nature of which they inadequately comprehend, necessitates a close inspection of their individual methods and working places. The complaint of the mine foreman is not against inspection in itself, but against being at once both a servant of the company to advance its interests by increasing its output and by diminishing the cost per ton, and also the servant of the state, inspecting without cost to the commonwealth, the mine equipment, working methods and places of the miners and others.

Clearly his duties are peculiar in kind, almost without parallel in law. He is responsible to the law for himself, his employers and his employees. He is custodian of the law and boss in many matters both of himself, his employing operators and his men. Yet to his employer he must look for his pay, his advancement, his comforts, his reference on leaving—an anomalous position surely. He can only bring pressure to bear on his employer by resigning or by reporting the case to the inspector—an officer who cannot do anything to hold him permanently in his position should the employer be displeased at his advocacy of a lawful conduct of the duties of his office—an officer who does not wish to exercise pressure on the foreman's employer in his behalf, for fear of receiving censure for any economic inability which might be alleged or proved against his protégé.

The mine foreman should be relieved of the necessity of harmonizing conflicting purposes and of the duty of serving two masters. He cannot be both the state's man and a private employee and fill both antagonistic offices with credit to himself and satisfaction to others. The foreman of today should evolve into two specialized functions.

Does It Pay?

By W. H. Droll*

We are beginning to realize the existence of a great problem in this country, especially in our mine camps, where the problem of sanitation is a leading question. Formerly we opened a mine, and the camp soon grew up around the pit's mouth, without due regard to sanitation, building laws or layout. The development of a mining town was a helter-skelter proposition.

The more progressive coal companies realize the evil of this method and are beginning to straighten out their camps and clean them up. We all know that health is essential to good work and that a sick miner cannot accomplish as much as one who is in good health. When miners work in pairs, the sickness of one man throws his "buddy" out, and in a pitching seam this means the rearrangement of cars.

We are beginning to realize that the most important enemies of the mining companies are the typhoid germs in the drinking water. We know that the mosquito carries these bacilli and that the insect breeds and thrives in damp and wet places. We realize that the old "summer complaint" found among mining communities comes from the same source. We no longer build our camps haphazard. We lay them out so that the rain in soaking through the ground does not carry the germs from the outhouses to the nearest spring or stream. We no longer build open closets, where the deposits are picked over by chickens and hogs. We have ceased to regard the latter as a scavenger, placing our faith instead in a sanitary department, which removes the food from the housefly and prevents the mosquito from breeding.

The Coal Fields of Michigan

The coal fields of Michigan occupy an isolated basin covering approximately 11,000 square miles in almost the exact center of the lower peninsula. They are estimated to have originally contained 12 billion tons of coal, from which the exhaustion to the close of 1912 has amounted to about 30 million tons.

The principal coal-mining operations are in Bay and Saginaw Counties, but a smaller production, chiefly from local mines, is made in Clinton, Ingham and Tuscola Counties.

Coal was known to exist in Michigan early in the last century and some mining is said to have been done in the Jackson field as early as 1835. Other mines were opened at Grand Lodge in Clinton County, in 1838. It is known that some coal was produced in that place in those early years, but there is no record of the output prior to the census report of 1860, in which Michigan was credited with a production of 3320 tons. It is only within the last 12 years that the coal fields of Michigan have been worked to any considerable extent, and their development has followed in some degree the depletion of the forest resources.

*Johns, Ala.

Manure as a Protection for Concrete

By Newell G. Alford*

SYNOPSIS—The general conditions governing the setting of concrete and the results of a trial in utilizing the heat-producing qualities of fresh horse manure upon a large reservoir in an exposed location during severe winter weather.

Founded upon the basic heating qualities of manure from horse or mule stables lies a practical possibility for construction men to erect concrete in freezing temperatures without incurring undue expense or having to anticipate anything but the best setting results in the mixture handled. Not only will the cost of such protection be moderate, but it decreases directly as the area of the surfaces to be treated increases. Furthermore, the temperature of the manure remains practically a constant for comparatively long periods.

Not infrequently is a mine manager or superintendent confronted with the necessity of installing concrete about his surface operations in the winter season. Even though low temperatures make such construction hazardous and expensive, at the same time the work must be undertaken and pushed through in the face of possible ruin through freezing.

The new construction may be a retaining wall, a reinforced reservoir, foundation piers or some other work common to the class of concrete construction usually found about the surface plants of coal mines. However, it goes without saying that when the necessity for this character of installation occurs in the winter time it devolves upon someone to devise a scheme for accomplishing the desired result.

Cold Concrete Sets Slowly

Extensive experiments in concrete work done under severe weather conditions, and low temperatures, show that the use of calcium chloride furnishes a partial safeguard against the dangers encountered in cold weather. But this will not prevent ruin to the mixture unless there is a sufficient heating element surrounding the forms inclosing the concrete to permit it to set under normal conditions.

To quote from Prof. F. E. Turneaure: "The effect of temperature on the rate of setting and hardening in cement is very great and often requires special consideration in processes of construction. At or near 30 deg. F., the rate of setting and hardening is very slow. Experiments on natural cement mortars indicate a speed of hardening at 40 deg. about one-half that at 80 deg. on 60-day tests. Tests on portland cement show that at the temperture of 40 deg. the strength at 30 and 60 days is about two-thirds that attained at a temperature of 70 deg. At or near 32 deg. the time of setting is greatly prolonged. Cement setting in 8½ hr. at a temperature of 65 deg. required 38 hr. at 32 deg."

Under the usual conditions in winter, it is impossible to predict with any accuracy whether fires at intervals about the concrete forms will yield the desired results. In isolated cases, there are perhaps walls of neighboring

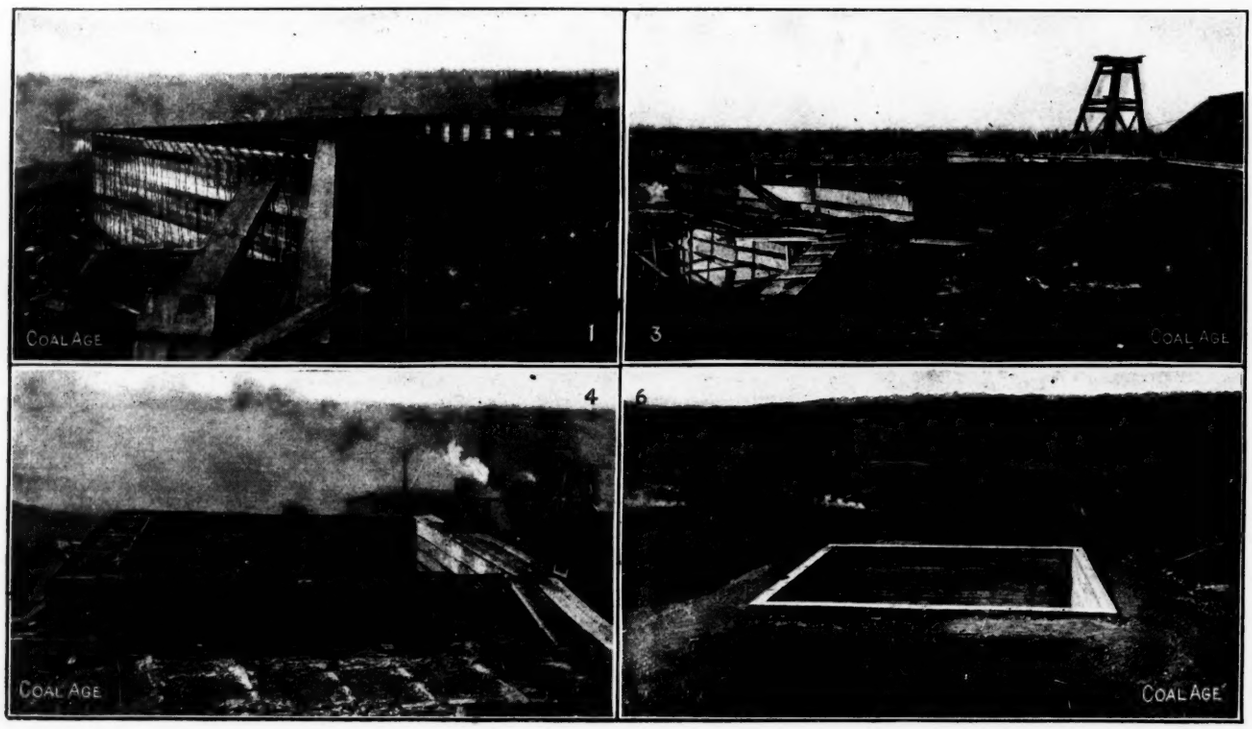

Fig. 1. One Half of Form Complete
Fig. 4. Completed Structure with Forms
Fig 3. Concrete and Manure in Place
Fig. 6. Reservoir after Completion

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structures or like shelter provided by local conditions, but these are infrequent.

Ordinarily the wind can sweep down upon the structure, always detracting from some portion of the protection afforded by the fires. Thus the temperature in which the concrete sets is variable, compelling a wide range of setting conditions for the cement mixture. Therefore, it is easily comprehended how a packing of manure within suitable retainers about the forms produces a heat, at no time subject to sudden changes, and which affords simultaneously a constant setting temperature for the entire mass of green concrete.

During the winter of 1912-1913 a reservoir was needed at the coal-washing plant of the St. Bernard Mining Co., at Earlington, Ky. Since shipment on a steel tank of the necessary capacity could not be had under 100 days, and conditions demanded an adequate water storage in 60 days, a reinforced-concrete reservoir was chosen. It was also held that the approximate life of a steel tank would be 15 years, at the end of which time the concrete installation would have only attained its maximum strength.

The reservoir was constructed 10 ft. deep and 25 ft.

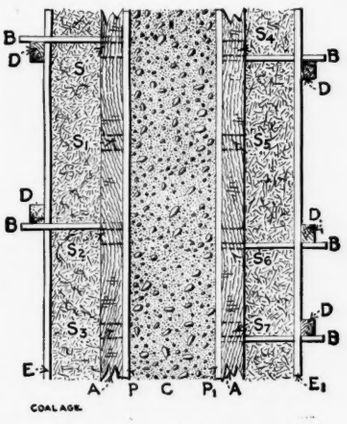


FIG. 2. PLAN VIEW OF WALL WITH CONCRETE AND MANURE IN PLACE

square, with walls 1 ft. thick, reinforced by ⅜-in. diameter steel rope. The capacity of the reservoir was, therefore, approximately 46,750 gal., being slightly above the amount of water required.

To facilitate proper setting of the concrete, fires were suggested, but the engineer in charge decided to substitute manure as a heating element, believing that he could thus secure better results. In order that an accurate conclusion might be arrived at concerning the effect of the manure, a minute record was made of the work as it progressed.

DETAILS OF FORM CONSTRUCTION

The inner ring of the form was first put in place and the reinforcement suspended as shown in Fig. 1. To facilitate pouring, the outer side of the form was put up in four sectional rings, each tightly joined upon the other. When the concrete had been poured level with the top of the first section of the outside ring of the form, secondary framework was attached to the primary.

To make the method clear, consider Fig. 2, showing a section of the structure's plan. Looking down from the top, P and P_1 represent the tongued and grooved pine siding containing the concrete. C shows the concrete in place. A and A_1 represent the 2x4-in. plates, which were placed horizontally upon the ends of the vertical studding S, S_1, S_2—S_7.

To such convenient studding as S, S_2, S_4, S_6 and S_7, small boards of sufficient length were nailed to act as cleats. To the cleats B, uprights D were nailed 6 or 8 in. from the outside faces of P and P_1. The 1-in. boards E, of any width, were then nailed to D, forming a box on both sides of the concrete in which the manure was to be packed.

Manure hauled from the mine stables had been piled conveniently close to the work. This was next wheeled in barrows, dumped and tamped tightly between the vertical faces of E and P and E_1 and P_1.

This method was followed out until the entire form,

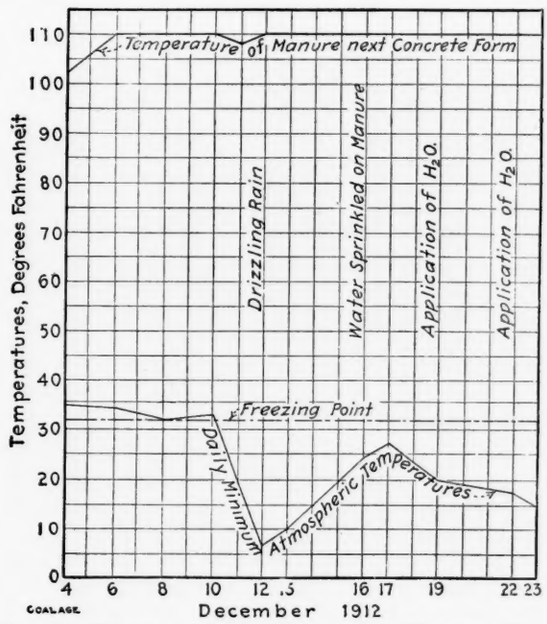


FIG. 5. TEMPERATURES OF AIR AND MANURE PROTECTION

10 ft. high, had been filled with concrete and manure. It then presented the appearance shown in the side view, Fig. 3, or from the hill immediately above as shown in Fig. 4.

The floor of the reservoir was also protected with manure, but was first covered with canvas to prevent its being marked. Then a layer of manure 6 in. thick was spread over the canvas, this in turn being covered carefully with 1-in. boards to prevent disturbance from the wind.

The concrete pouring was completed with the manure intact about the form on Dec. 4. In order that any variance in the temperature of the manure might be observed, readings were made and recorded during the succeeding 19 days. In observing these temperatures, a standard Fahrenheit thermometer was placed next the pine siding P and P_1, which held the concrete. In other words, there was the thickness of the manure between the thermometer and the atmosphere. Ten observations on the temperature of the manure were made at one time, the mean being taken as a fair result. These figures are recorded in the upper curve given in Fig. 5.

In order to show the existing difference between the

temperatures of the air and the manure next to the concrete atmospheric temperatures have also been plotted. These are the minimum readings recorded by the Government Weather Bureau Station, at Earlington, Ky.

The only variance in the manure temperature curve is found on Dec. 11, when the heat dropped 2 deg. This was undoubtedly caused by the severe wind which had blown during the two preceding days, and which tended to drive the moisture from the manure.

On Dec. 12 there was a slight drizzling rain despite the low atmospheric mercury reading, after which the manure was seen to steam perceptably. The temperature was, therefore, taken and found to have resumed the constant of 110 deg.

This experience indicated that periodic sprinkling of the manure with water would sustain the chemical action producing heat. Accordingly, on Dec. 16, it was given an application of water with a hose, and this was repeated on the 22nd. This effect of the moistening, as shown in the upper curve on Fig. 5, was the maintenance of a constant temperature in the manure. It will be seen that this temperature, with the exception of one day, remained at 110 deg.

On the other hand, a glimpse at the atmospheric curve indicates that the minimum temperatures ranged from 35 to 7 deg., the average being approximately 23 deg. Thus the average difference in temperature afforded by the manure was 87 deg. In this connection it is interesting to take into account the latent chemical action which causes the results.

Why Manure Heats

Horse manure is rich in nitrogenous substances, contains nitrifying bacteria, and also hydrocarbon compounds, such as cellulose, starches, etc. The nitrogenous material is first broken down by the bacteria, and in the presence of substances containing hydrogen (such as straw) forms ammonia, which is later oxidized.

If any sodium salt or potassium salt is present, sodium nitrate ($NaNO_3$) or potassium nitrate (KNO_3) is formed, so that saltpeter (KNO_3) is usually found in old manure.

The bacteria referred to will not work except in the presence of moisture, so that when water is added to the manure they work very fast, producing sufficient chemical reaction to account for an increased quantity of heat. Manure, if dried, will not ferment, but the bacteria are not killed. All they need to revive their action is an application of water. This explains the rise in temperature of the manure, shown in Fig. 5, on Dec. 12.

The manure protection on the work described above cost $59.95. If the protection had been accomplished through the medium of fires the cost would have probably reached $195.70. An analysis of the manure protection expense reveals the following:

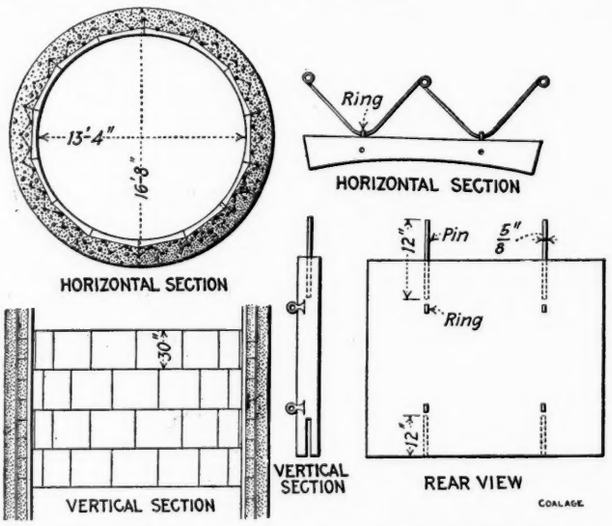
Timber for framework, etc.	$40.45
Hauling manure 1¼ mile	10.25
Labor	9.25
Total	$59.95

Since the manure possessed a fertilizing value after its removal from the concrete forms no charge was made for its use. Two thousand nine hundred and seventeen square feet of concrete surface was involved in the undertaking, which constituted a cost per square foot of $0.02. Compared with this, using driftwood with charge, the same protection by fires would have amounted to $0.067 per square foot.

Finally, the concrete was constructed at the summit of an ascent about 100 ft. above a natural basin from which the timber has been cut. The wind had access to the four sides of the structure, which, despite fires, would have made uniform setting conditions for the concrete wholly impossible. Fig. 6 shows the reservoir as it is at present, the forms having been removed and a dirt fill made next to the outer concrete surface.

Concrete Shaft Lining

At No. 1 mine of the United Collieries of Charleroi, Belgium, a small 133-ft. shaft has been sunk recently. It is about 13 ft. 4 in. in diameter and 16 ft. 8 in. over all. The lining is formed of concrete blocks, with their vertical joints staggered. Between these voussoirs and the rock, concrete is poured. The blocks were made at the mine in wooden molds. They are 30 in. high and 3.2 in. thick, in the thinnest place. Fourteen of them are needed to make a complete ring in the shaft.



Concrete Lining and Forms of Concrete for a Belgian Shaft

In each block are embedded two iron dowels 0.6 in. in diameter and 12 in. long; these project 6 in. from the top edge of the block and fit into holes in the voussoir above.

In the concrete between rock and inner lining is embedded a bent rod of iron about ½ in. thick, which is laced through rings anchored in the backs of the blocks, there being four rings to each block. The V's formed by this bent rod are joined together by bars 30 in. long and 0.4 in. in diameter. There is understood to be a further reinforcement of the cement mass, not indicated by the drawings, and reinforcement in the several blocks.

The cost of construction is figured at $8.65 per running foot. Tests have shown this lining to be equal in strength to one of masonry 32 in. thick, which would cost $13.50 per running foot of depth.

The concrete mixture used is six parts of gravel, three of sand and three of cement.

Note—Translated and abstracted from the "Annales des Mines de Belgique," by E. P. Buffet for "Coal Age."

Explosions at the Cadeby Main Colliery

By Our British Correspondent

SYNOPSIS—A brief abstract of the report of the British chief mine inspector on the explosions at the Cadeby main colliery, which killed 88 men, including 53 rescuers. A fire in the mine, which ignited the firedamp present, is believed to have been the cause of the explosions. This fire was supposed to be walled off, but apparently an inlet was left, probably along the longwall face. The inspector questions whether it is wise to risk life to bring out dead bodies.

The report of the British Home Office into the causes of the explosions at Cadeby Main Colliery, in Yorkshire, on July 9, 1912, has recently been issued. It will be remembered that there were two principal explosions, the first destroying 35 and the second 53 lives, making the total death roll 88. Among those killed, were several mine officials, including the mine manager, also three inspectors of mines, including the divisional inspector, W. H. Pickering. The report is by R. A. S. Redmayne, the chief inspector of mines of Great Britain and Ireland.

The output from the Cadeby mine is about 3000 tons a day, coal being hoisted at both shafts. These are 16 ft. in diameter. No. 1, the downcast, is 2256 ft. deep, and No. 2, the upcast, 2214 ft.

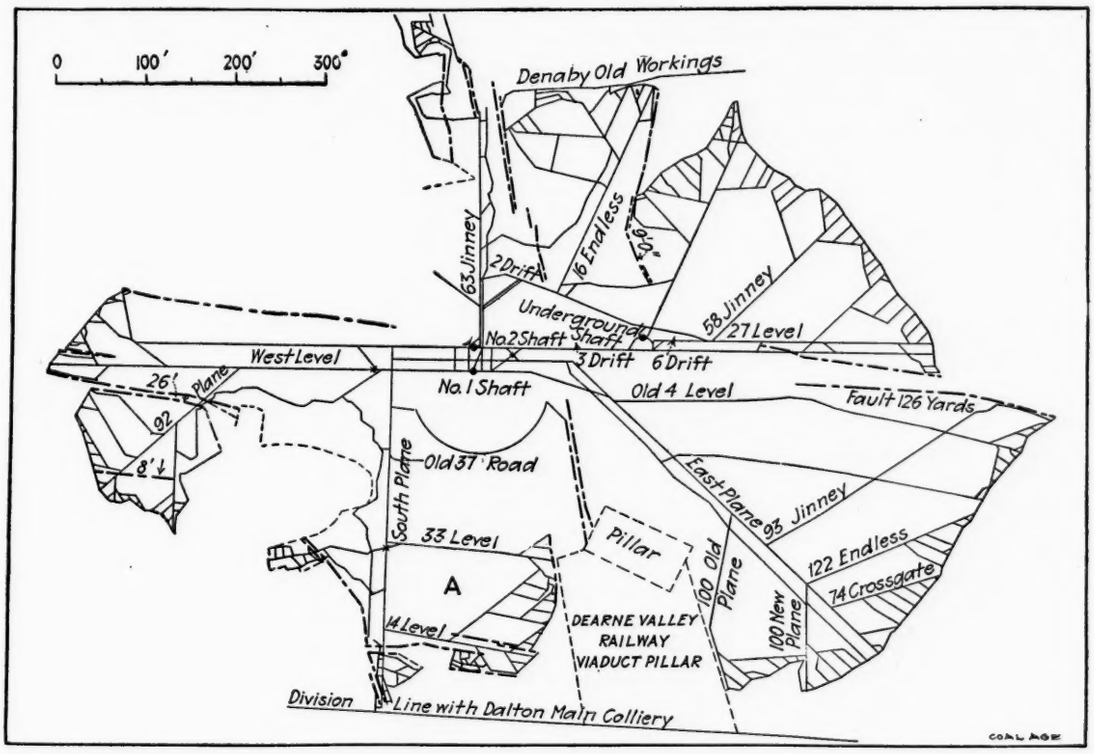


Fig. 1. Cadeby Main Colliery in South Yorkshire, England. The Section Marked *A* Was the Scene of Two Severe Explosions

Description of Mine

The two shafts of the Cadeby main colliery are sunk to the Barnsley bed, which is the only seam worked at this mine. It lies at a depth of 2289 ft. from the surface, on the dip side of a large fault, which has a throw to the south of 378 ft. (see Fig. 1). The coal on the north side of this fault is won by a pair of headings driven through the rock at that displacement.

Thirty-Five Fires at Cadeby

It will be seen that about 49 ft. above the Barnsley bed is a seam of coal 2 ft. 2 in. thick. The top coal of that bed is of inferior quality and mixed with dirt. The immediate roof of the seam is a shale, variable as to hardness, but of moderate reliability. The Barnsley bed is a gassy seam, which, in South Yorkshire, is peculiarly liable to spontaneous combustion. At Cadeby there have been no less than 35 fires ascribable to that cause. To work this bed safely, requires the greatest care and vigilance. The dip of the seam is 1 in 14 to 1 in 12 to the southwest.

Methods of Working

The system of working practiced is long wall, the distance between the gate roads being usually 120 ft. Packs, 7 ft. 6 in. wide, are built on either side of these roads, and every 21 ft. a gob pack, 6 ft. wide, is built. The material used for building the packs is stone, obtained from the waste and from the ripping in the gates. In the main roads much of the brushing has to be done in the shale roof, thus forming a large amount of stone dust. This dust considerably decreased the extent of the explosions. All the coal was mined by hand; neither coal cut-

ters nor conveyors were in use. The coal being fairly friable, a certain amount of dust was made at the face, but not an unusual quantity.

The following is a section of the seam at the shafts and of the strata immediately above and below the Barnsley bed:

SECTION OF STRATA IN CADEBY MAIN SHAFTS

		Ft.	In.
Coal	1ft.5 in. coal, hards 2-in. bituminous shale 7-in. coal, cannel	2	2
Dark blue shale		4	0
Coal			1
Dark blue shale		1	7
Bank			2
Dark blue shale		4	0
Strong shale		6	0
Grey rock		6	7
Strong shale		16	0
Blue and black shale		7	0
Strong shale		1	0
Shale with ironstone bands		2	0
Coal	Day beds	1	1
	Bagmuck	..	6
	Bags	..	7
	Parting	..	½
	Bags	..	8½
	Parting	..	1
	Top softs	1	11
	Clay seam		4
	Top hards	2	0
	Bright hards		3
	Bottom hards		9
	Bottom softs	2	0
Shale		2	0
Hard fireclay		6	0

Manager Fired All Shots

No shots were fired except in rock headings, and then only at week ends, when few persons were in the mines. As an additional safeguard the manager alone was permitted to fire the shots.

The cars were hauled in the main intakes by an endless rope, electrically-driven from the bottom of the shaft; the secondary haulage was performed by horses and ponies.

At the time of the accident, the volume of air circulating in the mine was about 163,000 cu.ft. per minute, under a water gage of about 3½ in. The air was drawn through the mine by a Schiele fan, 21 ft. in diameter, making about 119 r.p.m. Although the Cadeby and Denaby mines are connected by means of an emergency outlet, the ventilation system of the two mines was entirely separate, the iron doors in this connecting airway being kept locked.

The Marsaut type of safety lamp was used exclusively by the unofficial workmen. The lamps found after the disaster were examined and all those in places where the gas might have been fired were found to be intact.

Precautions against Screen Dust

The surface arrangements are described as admirably designed to prevent the floating dust produced by the movement of the coal at the dumps, screens, conveying belts and hoppers from being carried down the downcast shaft, and so on to the roadways of the mine. The dust is collected wherever made, by means of funnels attached to pipes connected to an exhaust fan, which creates a partial vacuum (2½-in. water gage), the current of dust-laden air passing from the fan into a cyclone where it enters a steamy atmosphere maintained by a steam jet from the boilers; this prevents any of the lighter dust from escaping by the chimney to the outer atmosphere. Where necessary, the screens and hoppers are almost entirely inclosed. This arrangement, which has been in operation for about five years, has proved effective in clearing the air of dust about the headframe and tipple. Practically none of the powdered coal is carried by the ventilation down the intake shaft to the underground workings.

South Plane District

The effect of the explosion was limited to the district, tributary to the South Plane, see Fig. 1. This area is described as dry and dusty. The endless rope worked as far inby as the 14th level, the haulage along that road for a distance of about 450 ft. being by tail rope attached to the endless rope by means of a clip. Beyond this point horse haulage was employed.

The volume of air entering the south district was 21,661 cu.ft. per minute. About half this air went along 14 level to ventilate the district in which the explosions occurred, returning by way of 33 level, which crosses the south plane at a point about 2900 ft. from the shaft. The other half went into the area at the end of the south plane and ventilated the workings at that point.

This South Plane district had not a long life before it. It was near the boundary of the Dalton Main colliery, on the south, while to the east, it was approaching the pillar of coal left to support the Dearne Valley Viaduct.

Fires, Gas and an Explosion in South Plane District

Gob fires had been known in the neighborhood of the face fault for some time past, the first developing in August, 1906, at the face and occurring right up against the fault in old 37 stall. This fire was dug out.

A second fire occurred not far away from the first, being on the upper side of the crossgate out of 33 level on the fault side, where some timber had been left.

A third fire, to which the explosion was probably due, occurred at old 121 stall, also against this fault. This was discovered on Nov. 20, 1911, and when scouring roads were driven to it, it was found that the fire had backed from the fault for a distance of 24 ft. into the gob. On Jan. 20, 1912, a small explosion of gas occurred at this fire, slightly burning four men who were engaged in working at the face. The effect of this explosion on the air was felt about 450 ft. distant; it frightened all the men in the district and they came out.

Five flashes were seen on Feb. 2, and also on Apr. 10, while on Apr. 2 a gas cap on the flame of the safety lamp was noticed on top of the old scourings. Coming to July, "gob stink" was reported in 121 old gate by deputies on the 5th, 6th, 7th and 8th of the mouth, but gas was not mentioned as being present on any of these days.

The First Explosion

From a consideration of the evidence presented, Mr. Redmayne concludes that the first explosion originated about 64 gate, mostly probably in the neighborhood of the face of 7's working place, and traveled in two directions. Apparently, the fire just mentioned had been shut off along all the gateways leading to it, but along the front of the face fault an inlet for air had been left. This received the intaking air current, which, however, had passed along the line of face from gate 131 onward, and consequently possibly contained some gas. Mr. Redmayne believes that this inlet should have been closed, and in fact urges that the intaking air current should be shut off before the return.

The explosion directed itself partly toward the intake,

going down to 121 crossgate and running along that haulageway and also along the face to 12 gate. On reaching 14 level, the explosive blast seemed to have developed its greatest violence, either owing to accumulations of coal on the landing or because along this intake airway it found enough air to render the mixture of gas and dust more explosive. There was no evidence of burning by the first explosion for any distance beyond the end of 19 crossgate, but there was evidence of force up to the end of 14 level, as the cars at the outby end of this level were blown on to the plane.

The explosion also projected itself toward the return, passing down 64 gate, and with force and flame continuing along 19 landing to 19 crossgate. Mr. Redmayne does does not think, however, that the flame reached the end of 19 crossgate, but that the explosion died out along that road. He thinks it stopped for want of fuel to feed it.

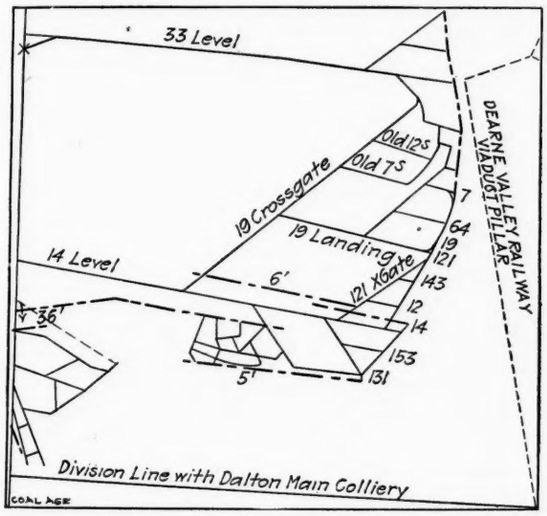


FIG. 2. THE PART OF CADEBY MAIN COLLIERY WHERE THE EXPLOSIONS OCCURRED

The supply of gas was exhausted, and the dust was too much intermixed with stone dust to allow of the continuance of the explosion. An analysis of the sample taken when an entry was made to the recovered workings in 19 crossgate below 19 landing, showed it to contain 80.81 per cent. of ash and the dust was coarse, only 10.52 per cent. passing through a 100-mesh sieve.

Probably the blast in 14 level was stopped by the same immunizing stone dust for a sample from this level at the foot of 19 crossgate contained 48.31 per cent. of ash.

THE SECOND EXPLOSION

The second explosion seems to have traveled wholly on 14 level and along the face, as there were no signs of force or burning other than were occasioned by the first explosion in gates 64 or 19, nor along 19 level or crossgate.

Mr. Pickering suggests that there was a large accumulation of gas on the rise side of the district after the first explosion, which, igniting at the fire, burnt more or less quietly up and down the face until an explosive mixture was formed at about 14 level, when it detonated. The force in 14 level was very much greater than in the first explosion, and the flame probably extended nearly to the outby end of that level. Had the explosion extended far on the South plane, Mr. Redmayne thinks it is probable that the whole colliery would have been wrecked, analyses of samples of dust showing that it was of a dangerous character.

POINTS IN RESCUE WORK

Mr. Redmayne condemns the lack of organization which permitted men to enter the mine after the explosion without written authorization. A guard should have been placed on the outby end of the South plane to prevent unauthorized persons entering from other parts of the mine. Had this been done the loss of life occasioned by the second explosion would have been much less heavy.

Mr. Redmayne does not think, however, that the management of a colliery is justified in allowing persons to risk their lives in the recovery of dead bodies. There is always great risk of a second explosion when a fire is known to exist underground. It sometimes requires much moral courage to restrain oneself and to prohibit others from undertaking a risk of this nature.

The correct number of casualties was not definitely ascertained until three days after the disaster, owing to the indiscriminate issue of lamps after the first explosion.

Mr. Redmayne urges that until the fire had been completely isolated by stowings and stoppings, all the men not engaged in combatting the fire should have been withdrawn from the district in which it occurred.

Mr. Redmayne quotes the evidence of W. H. Chambers, the manager of the Cadeby and Denaby Main Collieries, who has had 30 years' experience of underground fires at Denaby and Cadeby, during which period he has dealt with 56 cases, some at the coal face and others in the worked-out areas.

FIRE STARTS IN CRUSHED COAL OF CREVICES

He said that a large proportion of the face fires had occurred in the neighborhood of faults, this fact being due to presence of pulverized coal in the fissures, which offers a considerable area for the absorption of oxygen from any air, which may be found in the fissures.

There is often sufficient air to start such chemical action, but insufficient to carry off the resultant heat, and hence the fine coal gets hotter and hotter until it reaches the point at which combustion commences.

A number of fires, however, have occurred in the worked-out areas, but they generally originated in the fissures *above the goaf,* the oxygen necessary for combustion finding its way along these crevices. He said there was a "rotten" roof, and that was the reason why they could not work the whole of the seam. They had to leave the top coal to prevent the fall of the shales above it. Fires break out freely, if the workings are allowed to stand even for a few days, and even when the progress of advance of the coal face is slow, as when impeded by faults. Therefore, he found it necessary to keep the face continually advancing irrespective of the state of the coal market.

Mr. Chambers defended his present system of leaving 21-ft. wastes between gate packs 7 ft. 6 in. wide. Intermediate packs were also used, mainly because the latter were necessary to keep the face open. He did not favor the hydraulic method of stowing the waste, because he had doubts as to its efficiency in preventing the formation of fissures, and he foresaw insuperable difficulty in the way of its adoption at Cadeby colliery, owing to the fact that water was necessary if this system was used.

He had experimented with water as a means of laying the dust upon roadways, but he had found that even the small quantity required for this purpose had such an injurious effect upon the roof that the roads were closed.

Since the explosion at Cadeby Main, Mr. Chambers had, however, devised a method of dealing with gob fires by excluding the oxygen altogether, which had proved successful in the recovery of the South Plane district after the recent explosion. If a sign of heating in the gob is detected by an analysis of air or otherwise, the ordinary ventilation of the pit is excluded from that particular area, and there is forced into it a gas deficient, or entirely wanting in oxygen so that instead of the fire being fed by air containing 21 per cent. of oxygen, it is gradually stifled by an inert atmosphere of increasing density.*

Leakage, if any, would then be outwards from, not inwards to, the fire. To facilitate this procedure he would lay along the roads a system of pipes, which could be put into operation at any moment. The gas to be employed should be absolutely inert, consisting solely of nitrogen and carbon dioxide, so as to be practically innocuous from the point of view of leakage.

Occurrence of Gob Fires

J. R. R. Wilson, one of the British mine inspectors, said that at three or four collieries working the Barnsley seam in the Doncaster area, these fires were becoming increasingly frequent, and were a source of great danger. He thought it rather more than a coincidence that the system of working at each of the collieries was the same, viz., longwall, with narrow wastes and numerous gob packs, and he could not help thinking that this method was responsible for much of the trouble which was experienced with gob fires. He considered that next to stowing the goaf tight by artificial means, for example, the hydraulic method, the best course was to let the roof "stow itself" by falling. Hence he considered that wastes only 21 ft. wide with intermediate packs were inadvisable, on the ground that such a system prevented heavy breaks and did not let the roof fall sufficiently freely to tighten up the waste and exclude air until a considerable period had elapsed.

System of Working Compared

The inspector pointed out that in other parts of the same coal field, the Barnsley seam, with top coal as thick if not thicker than at Cadeby, is worked with little or no trouble from gob fires, and he thought it was significant that at all these collieries, with a 9-ft. gate and 7-ft. 6-in. gate packs, the gates are 66 ft. apart with no intermediate packs. Under this system the wide area of unsupported roof tended to fall freely to a good height, and then if the roads are well ripped and the packs tightly built, the roads are ultimately wholly in the hard stone above the goaf.

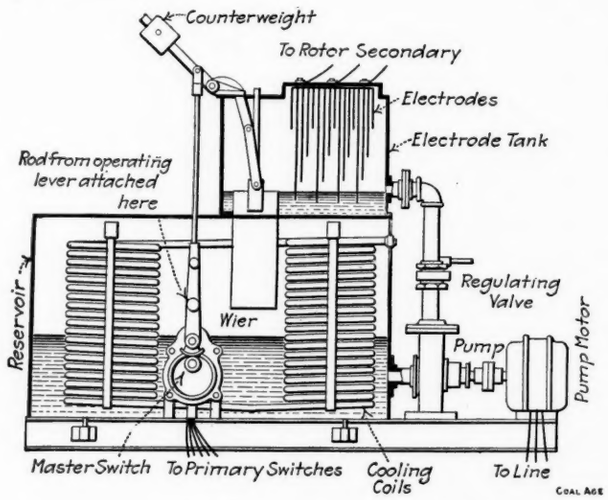
He was aware that this method had been criticized on the ground that to dispense with gob packs involved great difficulty in keeping the face open between the gates, but by the use of wood chocks this difficulty had been surmounted. He had never found that air would leak past heavy caves in sufficient measure that gob fires would be sustained.

*We do not believe that such a system needed devising, so often has it been advocated in American technical journals.—Ed.

Liquid Rheostats for Large Motors

The use of large alternating-current slip-ring motors for driving mine hoists, rolling mills, etc., has increased largely during the past few years and has created a demand for a simple, efficient and economical controller. To meet this demand the Westinghouse liquid rheostat in capacities of from 400 to 1500 hp. was developed.

These rheostats provide an infinite number of steps between the minimum and maximum limits, thus permitting fine speed adjustments and smooth acceleration. The rate of speed increase can be definitely fixed and is independent of the rate at which the operator manipulates the starting lever; it is therefore impossible to injure the motor or the machine connected thereto by too rapid acceleration.



Cross-section of Rheostat, Showing Mechanism

The principle of operation of these rheostats is clearly shown by the accompanying diagram. The apparatus consists of two compartments, an upper tank for the electrodes, and a lower reservoir. The three phases of the rotor are connected to electrodes suspended in the upper tank. A small motor-driven pump circulates a steady stream of liquid, usually a solution of soda, from the reservoir into the electrode tank, and back again over the weir.

Now by raising or lowering the weir, the height of the liquid in the electrode tank is correspondingly varied. The resistance in the rotor circuit decreases as the liquid level rises, and *vice versa,* and the motor speed, of course, changes with the rotor resistance.

The operating lever of the rheostat controls both the master switch and the weir. When the lever is in its central or off position, the primary switches are opened and the weir at its lowest level, so that the secondary resistance is maximum. Moving the lever in one direction closes the proper primary switches for starting the motor forward and raises the weir. Moving it in the opposite direction reverses the motor and again raises the weir.

A valve in the intake pipe of the electrode tank regulates the rate at which the liquid is pumped in, so that no matter how quickly the operating lever is moved, the liquid can only rise at the rate for which the valve is adjusted, thus fixing the rate of acceleration.

Erecting an Engine Underground

By B. J. Lowe*

SYNOPSIS—The methods followed to prevent the foundation from slipping upon a slanting foot-wall, of determining how much was to be removed from the lugs to bring the cylinder center lines parallel and making the two-piece flywheel tight upon the shaft with an 18-in. wrench are here described.

Properly erecting such a piece of machinery as a hoisting engine is by no means a difficult piece of work when all circumstances are propitious. Doing the same job some hundreds or thousands of feet underground by the weak, uncertain and often deceptive light of candles and carbide lamps may be a different proposition.

The writer was recently called upon to install underground, 2500 ft. from the surface, a cross-compound hoisting engine. The cylinders of this machine were 13½ and 21 in. in diameter while the length of piston travel was 24 in. Motion was transmitted from crank- to drumshaft through gearing at the ratio of 2½ to 1, the drum being 6 ft. in diameter. The engine was to operate on compressed air at 70-lb. gage and was designed to pull six loaded cars up an incline of 15 deg. at a speed of five miles per hour.

A chamber was first blasted out of the solid rock for the engine and foundation. This left a rough and decidedly sloping bottom. The height of floor line or bottom of engine base, as well as the center line of the engine, was next laid out by the mine surveyor. An ordinary template was prepared and set in place on this engine center line, with the foundation bolts properly placed therein. More than half of the foundation had to be built upon rock which sloped about 45 deg. to the horizontal, and, as considerable blasting was being done nearby, it was feared that the shock and vibration would cause the foundation to crack and slip.

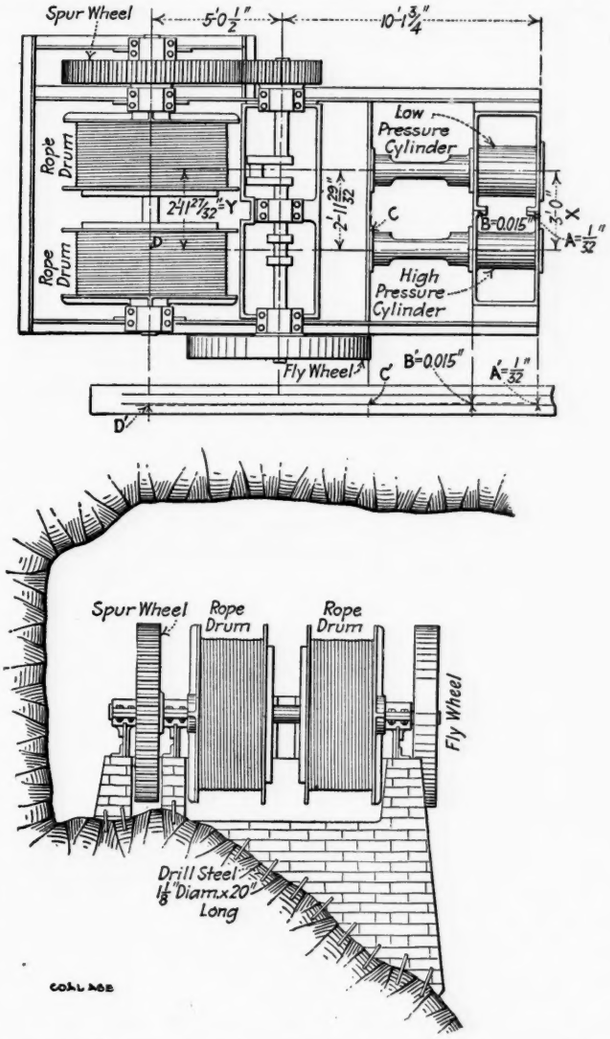
To prevent this, a number of holes were drilled into the bottom rock 10 in. deep and spaced 2 ft. each way. Pieces of old drill steel about 20 in. long were then grouted into these holes and, as the masons built up the foundation, they built in these "dowels."

When the foundations were finished, they were allowed to set for a week before any machinery was placed upon them. As many of the parts of the engine weighed over 2000 lb., a number of eye-bolts were securely fastened in the roof at convenient places for lifting purposes.

After the side frames, cylinders, trunks, pedestals, crank- and drumshafts had been put in place and securely bolted together, and the entire unit made level, fine steel wires were stretched through each of the two cylinders, extending to the drumshaft, and made central in the ordinary manner. The distance between these two wires was then carefully measured, and it was found that they converged, being $\frac{5}{32}$ in. closer together at the drumshaft than at the back of the cylinders.

As the cylinders and guides of an engine must be parallel, it became necessary to know how much must be removed from the lugs marked *A*, *B* and *C* to render the center lines of the cylinders parallel. To obtain this, a board about 12 in. wide, 2 in. thick and 18. ft. long, surfaced on one side, was placed beside the engine bed at the same height as the center line of the crankshaft. By means of a long straight-edge, two fine pencil lines were then drawn upon this board, each being parallel with one of the steel wires. These lines were accordingly out of parallel by $\frac{5}{32}$ of an inch.

Next points *A'*, *B'*, *C' and D'* were located upon these lines in positions exactly similar to *A*, *B*, *C* and *D* upon



Plan of Engine and Partial Section of Foundation, Underground Engine Room

the engine. As *C* was the point where the trunks were bolted to the main frame of the engine, this was considered as the pivot point, or the one where no change in the distance between center lines should take place.

The straight-edge was now placed at *C'* and swiveled until its edge became parallel with the first line. A third line was then drawn, intersecting the second at *C'* and continued each way to *A'* and *D'*. The distance between this line and the second line at the points *A'* and *B'* gave the amount which must be removed from the lugs in order to bring the center lines of the cylinders and trunks parallel.

*Germistown, Transvaal, South Africa.

It was found upon examination that the low-pressure cylinder was correct and square with the main shaft, while the high-pressure cylinder was the one at fault. This was accordingly taken off and the lugs filed down to their proper place. It was then put back and securely bolted up. The steel wire was recentralized and measurements at *X* and *Y* showed that the lines were parallel within the thickness of a fine pencil line. This was considered sufficiently accurate for all purposes.

By laying off these two lines upon the board and proceeding in the manner above described, it was only necessary to remove the cylinder once, it was not a case of "cut and try" on the amount which should be removed from the lugs, this being accurately known in the beginning.

When lining up the cylinders and trunks, as no inside micrometer caliper was at hand, touch gages made of a light piece of wood with an ordinary pin in each end were used. Being light in weight, an extremely sensitive touch could be felt. They had the further advantages of being cheap, easily made and extremely effective.

Rather strangely a 7-ft. flywheel was placed on the end of the crankshaft of this engine, a hand brake being fitted thereon to assist in holding the cars. This wheel was made in two pieces and bolted upon the shaft. As some trouble was experienced in tightening down the 1½-in. nuts, with an ordinary wrench, the bolts were removed one at a time, heated black hot, returned to their places and screwed up with an 18-in. wrench. Upon cooling off, these bolts, of course, shrunk and bound the two halves of the wheel together extremely tight.

The writer is pleased to state that this machine has now been working for some time and, to all appearances giving perfect satisfaction to all concerned. In setting up any engine under similar conditions, great care should be taken in making all measurements, as, under the very best of circumstances, the light of a candle or carbide lamp is liable to be deceptive.

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Peabody Coal Co.'s Tipple at Nokomis, Ill.

SYNOPSIS—At this tipple the coal is hoisted 85 ft. above the surface and screened over bars and perforated plates, the latter being of the shaker type. The tipple will handle 3000 tons per day and hoisting will be by electricity.

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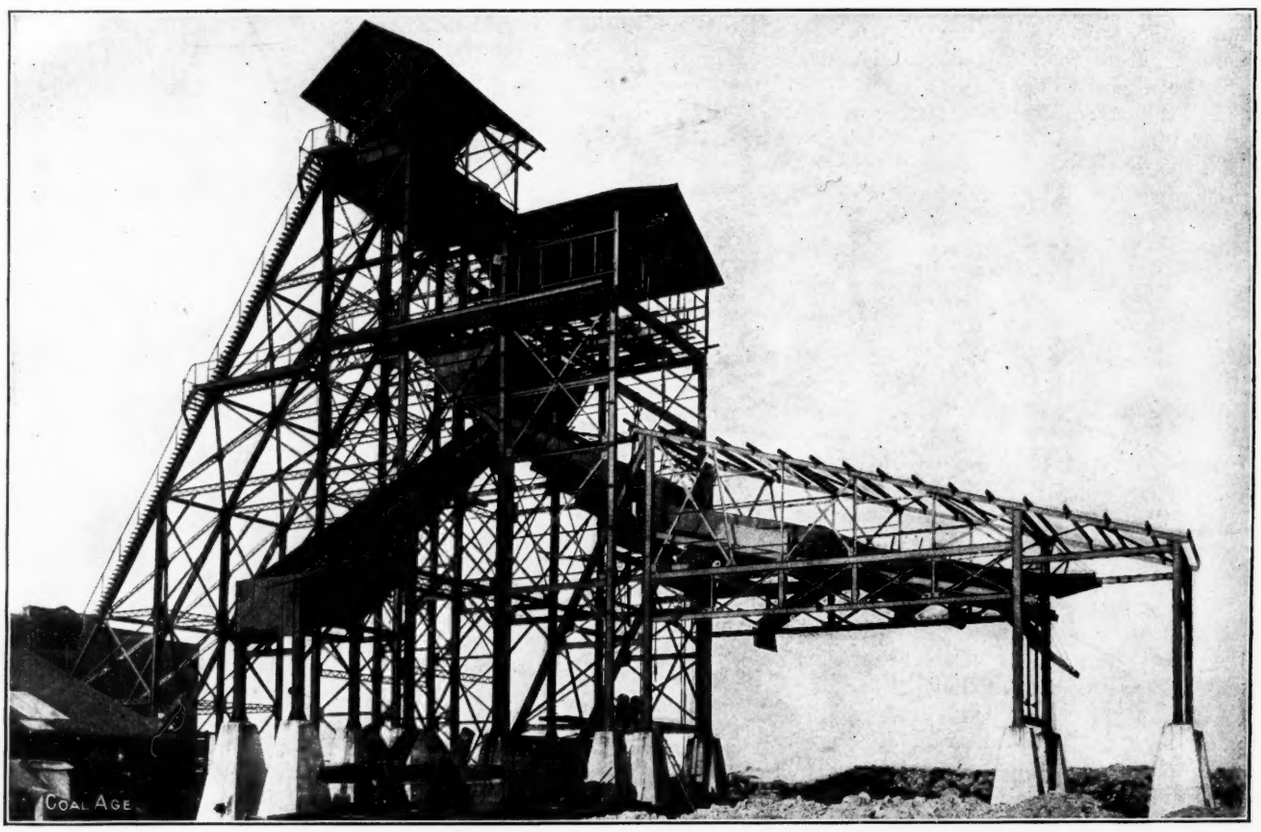
The Peabody Coal Co., of Chicago, is reconstructing its mine at Nokomis, Ill. Here a 6-year-old operation, indifferently equipped and able to hoist less than 500 tons daily, is now being outfitted with an entirely new plant, above ground and below.

For a long time the mining work done below ground has only been such as to prepare the workings for a daily production of 3000 tons. It is expected that this output will be obtained as soon as the present plant is complete. The entries have been driven long distances in all direc-



TIPPLE OF PEABODY COAL CO., AT NOKOMIS, CHRISTIAN COUNTY, ILL.

tions, and upwards of 750 rooms have been necked off and widened out, ready for the mining machines and wide-work production.

The shaft has been enlarged, and a complete new surface plant installed. Everything is to be electrically driven, by power brought in from outside generating plants. It is said that the tipple will be the largest in the state of Illinois.

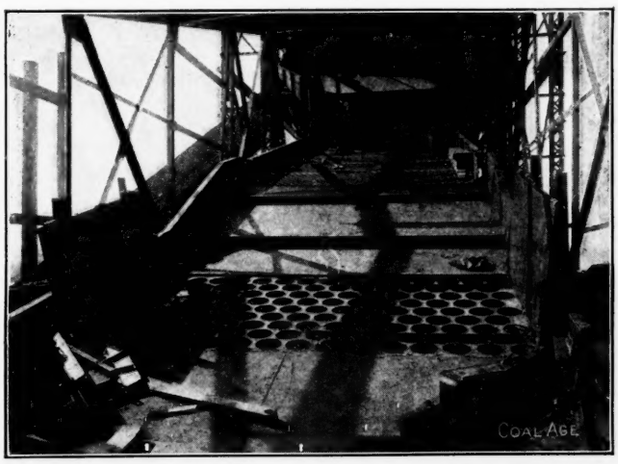
The shaft as now enlarged is of such size as to permit operation of double cages, and two cars will be hoisted at a time, side by side. The cars are to hold about four tons each, when the coal is well built up at the sides, so at each hoist there will be brought up and dumped about eight tons of coal.

The shaft depth is 640 ft. and the total hoist about 725 ft. The cages will be self dumping and operated by an electric hoist.

As the two cars brought up on each cage will usually have been loaded by different miners, there must be separate weigh hoppers to receive their contents.

The Screening Equipment

After weighing, the coal will descend directly over fixed bar screens for the removal of slack. Passing these



View of Shaking Screens, Looking Back Toward Weigh Hoppers

bars, the lump will be converged to the width of the shakers, and fed to them over an adjustable apron. The shaker screens are carried by a supporting structure completely separate from the main tipple framing. Hence, no shaker vibrations will be felt in the tipple tower.

The photograph of the screens was taken from the extreme end of the shakers, looking back at them toward the weigh hoppers. It shows clearly the arrangement of screens, veils, etc., for the preparation of all desired grades of fuel. Loading spouts beneath the screens catch the coal as it falls through and deliver it in its several sizes to railroad cars on the four tracks which will pass beneath the shaker when the grading is completed. The shakers are carefully counterbalanced and will be actuated by an electric motor.

The tipple was designed by the Peabody Coal Co.'s own engineers, and the structure was fabricated by the Wisconsin Bridge & Iron Co. The entire operative equipment, from weigh hoppers to car loading chutes, was furnished and installed by the Webster Mfg. Co., of Tiffin, Ohio.

Wastefulness at Power Plants

Addressing the meeting of the American Institute of Mining Engineers, Apr. 18, 1913, C. W. Beers made the following remarks, but it is a matter for doubt whether greater economy in mine practice would not be better than the purchasing of power for the mining load curve is often reasonably uniform.

"To understand correctly the reasons why a large producer of anthracite should find it economical to purchase central-station power, it is necessary to have a clear understanding of the ordinary steam production, and the uses to which it is applied in and around the various collieries.

"About eight or ten years ago, I was discussing with the mechanical engineer of a coal company the seemingly large amounts of steam used in various collieries, as the cry of the colliery management was constantly for more steam, although the installation of new steam-consuming devices was in no way proportional to the constantly increasing amount of steam generated.

"The mechanical engineer in reply advised that it was simply a waste of money to install more boiler capacity, and made the remark that the surest and best method of increasing the usefulness of the boiler plant was to get busy with the pumps and engines, meaning that if these steam consumers were kept in suitable repair, or rejected, and an entire new outfit substituted, that the duty of the existing boiler plants would be largely in excess of the actual steaming capacity required, and they would operate with better load factors with a consequent reduction in steam expense. A statement of this kind, coming from a liberal-minded engineer, is the unadulterated truth.

160 Lb. of Steam per Horsepower-Hour

"There are old-fashioned pumps in the mines today working on 24-hr. service that vary in age from 40 years down, and as long as they are able to push water they apparently fill the bill, regardless of the fact that they can consume easily 160 lb. (72.5 kg.) of steam per water horsepower-hour. Pumps on long-duty service are seldom touched on account of the time necessary to make suitable repairs, and when repairs are made the question is not "how economically will the pump operate?" but, rather, "how short a time will it take to make repairs?" One can imagine the condition of the cylinders, pistons, valves, etc., and with tight packing and a poor water end it is not a hard problem to guess where the steam is wasted.

"The same is true of engines. There are fine specimens of old-time workmanship and material in service 8760 hr. per year. Fans usually must be kept running at any cost, and, owing to the inability to shut down the engines to make necessary repairs, the pistons, rings and valves become badly worn with the result that large quantities of steam are used with a remarkably bad distribution. More than one fan engine shows 90 lb. (40.8 kg.) of steam per indicated horsepower-hour. These statements are advanced to show the condition of much of the machinery in use today. Colliery operations are usually conducted with the idea of getting maximum coal output, and little attention or money is spent in keeping the machinery in repair so that it may work at maximum economy."

Shaking Screens in a Concrete Tipple

By O. G. Petersen*

SYNOPSIS—A description is given in this article of a change in the design of shaking screens, so as to adapt them to use in concrete tipples, a long screen being replaced by a short-arm screen, in order to reduce the horizontal strains set up by their operation and at the same time increase the vertical strains. Moreover, the efficiency of the screens is increased by shortening the hangers, as it increases the action of gravity.

A company daring to place a device that gives as much trouble as a large shaker screen in a concrete frame, was strongly criticized at the time of completing the structure. Now that the plant has been in operation for a year and a half, the Stearns Coal & Lumber Co., of Stearns, Ky., feel that they have made a good investment.

Two factors entered into the successful design and construction of this plant. One was a shaker frame designed particularly to meet the periodical strains incident to shaker-screen operation. The other, a shaker-screen suspension system which replaces the usual longitudinal strains by vertical ones, strains that the concrete frame is well fitted to withstand.

An examination of the law governing the motion of the pendulum discloses some interesting facts when applied to shaker-screen operation.

$$T = 2\pi\sqrt{\frac{l}{g}}$$

in which

T is time of complete vibration in seconds;
π is 3.1416;
l is length of pendulum in feet;
g is value of gravity, assumed at 32.16.

The particular item of interest in this case is that the time of vibration varies as the square root of the length.

A well known and almost universally used type of shaker screen has hanger rods, which are six or seven feet long. By considering all the hanger rods as brought into one and the weight of the screens as concentrated at a point corresponding to that of the bob at the end of the pendulum and inserting the usual values in the above formula, we have

$$T = 3.1416\sqrt{\frac{7}{32.16}}$$

$T = 2.88$ seconds for a complete swing or period. This corresponds to 21 complete swings per minute. If there were no friction at the bearing points and the screen were set in motion it would swing of its own accord at this rate.

It will be noticed from the diagram of the pendulum, Fig. 1, that when the pendulum is seven feet long and the swing or double amplitude is 4½ in., the effective component due to gravity causing the weight to move is 540 lb., when the bob weighs twenty thousand pounds.

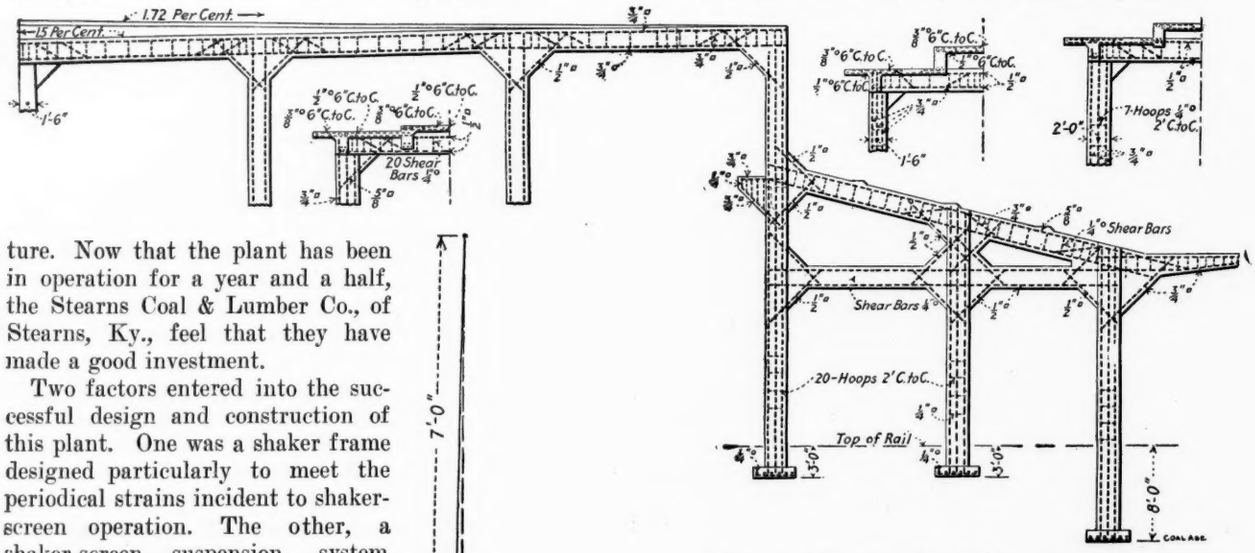


FIG. 3. ELEVATION OF CONCRETE TIPPLE

PENDULUM DIAGRAM

Inserting new values in the first used formula by giving the pendulum a length of six inches, or 0.5 ft., we have

$$T = 3.1416\sqrt{\frac{0.5}{32.16}}$$

T is 0.74 seconds, corresponding to 81 complete swings per minute. If there were no friction at the bearing points and the screen were set in motion it would swing of its own accord at this rate.

Greater Vertical Strains

Making a new diagram, Fig. 2, in which the pendulum is assumed at six inches, while the stroke or double amplitude is retained at 4½ in., we obtain as the effective component due to gravity 7680 lb.

Applying the two pendulum lengths to actual working conditions in having one screen with suspension rods 7 ft. long and a second with 6-in. rods or links, test instruments will show a power consumption of 15 to 25 hp. for the first when running at 110 r.p.m., and passing 250 tons per hour over a screen 72 in. wide and separating the coal into four sizes. For the second screen, running under similar conditions, the instruments record a power consumption of *six* horsepower.

A further examination of the diagram reveals an almost straight line, as the path of any point in the screen

*Assoc. Eng. Co., Louisville, Ky.

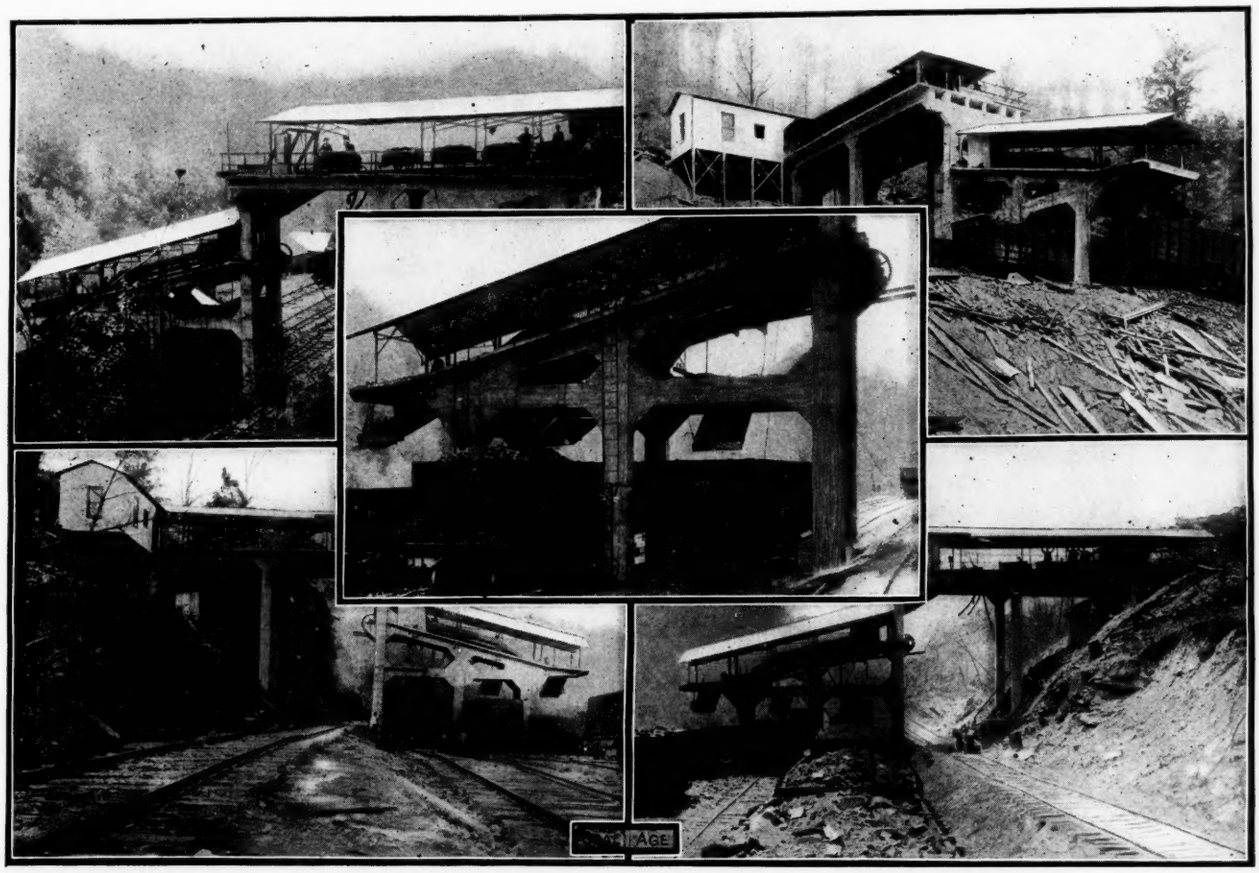
with 7-ft. rods, while the screen with 6-in. rods shows a vertical movement of almost ½ in. for the assumed stroke of 4½ in.

This vertical movement considered in connection with the path traversed by the coal on the screen, which is approximately that described by a six inch pendulum, and with the fact that the coal would therefore have a natural period of 81 per minute, while the screen is made to run at 110, shows why the screens keep themselves so clean. The screen plates actually drop away from the coal. This tends to displace the long-pointed pieces that persistantly remain in the holes of screens of the usual type and that can only be removed by the use of a punching bar.

The plant illustrated is provided with columns 2 ft. square. The beams, both shaker frame and tipple floor, are 2 ft. deep and 1 ft. thick. At all junction points braces are introduced, being 2 ft. on a side and 1 ft. thick. The tipple floor is 4 in. thick.

Shaker-frame beams are reinforced for concentrated loading. Tipple floor beams are reinforced for general loading.

Columns generally have six ¾-in. square steel bars and ⅜ in. hoop steel. The two 42-ft. columns supporting the shaker frame and the tipple floor and also transmitting the shaker strains to the tipple-floor anchorage have nine ¾-in. vertical bars. The floors have ½-in bars placed on 6-in. centers and passing from beam to beam. Longitudinal temperature bars are also used. The tracks are fastened to steel stirrups, that are cast into the concrete floor. A smooth surface is presented by eliminating ties.



Some Views of the Tipple of the Stearns Coal & Lumber Co., Stearns, Ky.

Design of Concrete Frame

Passing to the design of the concrete frame, a review of the column and beam dimensions reveals figures far above those used for bridge and building construction. In concrete we have the means to provide, at a reasonable cost, ample mass to withstand and counteract the strains set up by the periodic screen motion.

In addition to this structural advantage are those of freedom from fire, rust, decay and vibration and, as a consequence, no burden of insurance, paint and repair bills.

In getting ready for design, a thorough examination is made of the foundation material. For rock the columns are run to bottom with no change in their cross-section. For anything other than rock, a spread foundation is utilized, the area of this being determined by the nature of the material encountered.

At the dump, where two Philips kick-back dumps are used, the beams are 30 in. deep and the shock of the return of the dump is absorbed on a 6x6-in. white-oak beam 6 ft. long. The oak beam is removable for renewal. This effectively prevents the hammer blow of the dump affecting the concrete. Quick weighing scales are introduced on the load track. All loads come over one track, are diverted to one or the other dump, and when empty automatically seek their respective empty track.

Style of Screens

The screens have screening plates ¼ in. thick and by means of valves and delivery chutes can be set to give

any of the following sizes: 1-in. slack, 2-in. slack, 1- to 2-in. slack, 1- to 2-in. nut, 1- to 3-in., 2- to 3-in., any size round coal up to 6 in., any size block from 3 in. up, or run-of-mine with or without slack.

The suspension links are made in halves for ease in erection, and are provided with steel bushings. In these 3/8-in. steel rollers 4 in. long rest on steel pins 2 in. in diameter, that act as the stationary supports.

Connecting or pitman rods are made of hickory. A flexible point is obtained by reducing the cross-section of the rods to 1x6 in. at a point 12 in. back from the screen. No springs are used, as there is no shock at the end of the stroke.

It is obvious that the design lends itself to adaptation for drift, slope and shaft mining.

J. E. Butler, general manager of the Stearns Coal & Lumber Co., is to be congratulated in having the courage to face down the adverse criticism thrown at the structure during the construction period. Both he and the owners have since felt amply repaid for taking such a radical step.

The Associated Engineering Co., of Louisville and Somerset, Ky., control the rights under which reinforced-concrete shaker buildings, tipples and headframes and also short suspension shaker screens are manufactured.

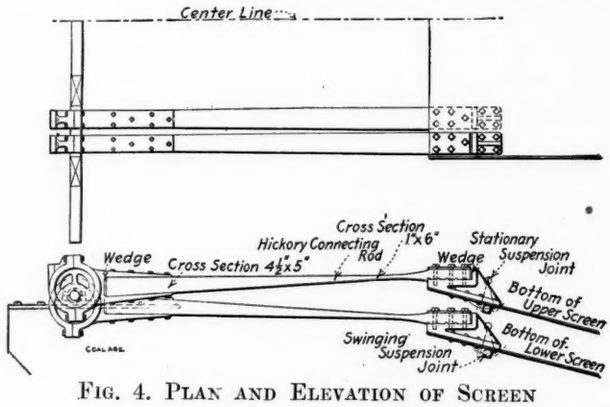


FIG. 4. PLAN AND ELEVATION OF SCREEN

They designed and built the plant illustrated in January and February, 1912, it being at that time, the first of its kind.

A New Mine-Rescue Telephone

SYNOPSIS—In mine-rescue work following a disaster there exists a strong need for a means of instant communication between the helmet party and the outside. This article describes a successful telephone equipment that does not in any way interfere with the oxygen apparatus.

The problem of devising ways and means for the protection of human life in mines is probably the most important question confronting the mining industry of today. The laws of practically every state in which mining operations are conducted, call for periodic inspections and contain many safety regulations, not the least of which in a number of states is a section making compulsory the installation of telephones underground.

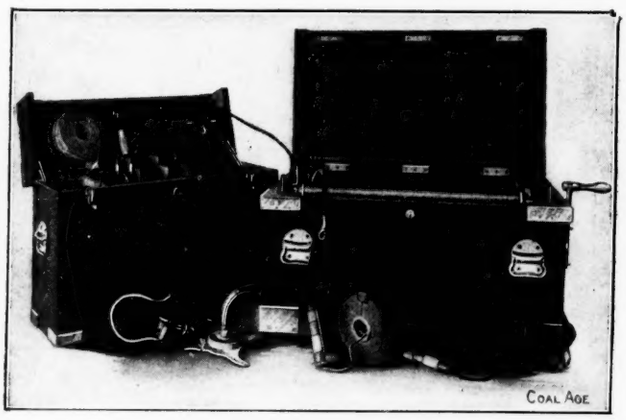
THE MANUFACTURERS KNEW THE CONDITIONS

During the past few years several thousand telephones have been sold and installed for use below the surface. The makers of these instruments were thus brought into intimate association with those interested in mine-safety work, and their attention was directed to the urgent need of some means of instant and continuous communication between an advance or rescue party equipped with its oxygen helmets and the rear party or that outside the mine. In the past, members of rescue parties have lost their lives where such loss could have been prevented by a quick and reliable means of summoning aid..

The demand for an equipment of this kind has been met by the Western Electric Co. in the production of light, serviceable and extremely simple telephone instruments for use in rescue work. In developing this apparatus the Bureau of Mines was frequently consulted, in order that every requirement for this severe service might be fully covered.

It is immediately obvious that a man wearing an oxygen helmet which effectually covers his mouth, cannot use the ordinary type of telephone transmitter. A special type, known as the throat transmitter, has been developed to meet this unusual condition. This instrument is light and compact and provided with a soft-rubber cup to adapt it to the curves of the throat.

This device has been found, by actual test, to transmit speech practically as well as the standard Bell instrument. Both receiver and transmitter are held firmly in position in such a manner that they will not interfere



COMPLETE SET OF INSTRUMENTS, INCLUDING REEL AND APPARATUS BOXES

with any type of oxygen apparatus now on the market. The telephone equipment used by the man at the outside or directing end of the line, is a standard switchboard operator's set, consisting of a chest-type transmitter and head-band receiver.

THE REARWARD CONNECTION

The rescue party is connected with the rear by means of a small wire cable, consisting of two copper conductors insulated with black enamel and two servings of silk, all of which is covered with a stout linen braid im-

pregnated with a moisture-resisting compound. This wire is in 500-ft. coils and is carried in a leather case fastened to the helmetman's belt, paying out as he advances.

As the coils are light, weighing less than 3 lb. each, several of them can be carried and as one is run out, another can be connected by means of a plug and jack combination. The wire is so wound that it cannot become tangled and will pay out in whatever position the rescuer may be obliged to assume. The total weight of telephone equipment carried by the helmetman, including one coil of wire, is only slightly over 5 lb.

One end of the coil is equipped with an aluminum-incased plug, which connects with the head receiver and throat transmitter by means of a similarly covered jack. The other end is equipped with a like jack connecting with a plug and cord running to a battery and apparatus box.

This box is an essential part of the equipment and

APPARATUS IN POSITION. NOTE THROAT TRANSMITTER

must be located at the point from which the rescue party is being directed. It contains eight dry batteries mounted in a Patterson screw-type battery holder, together with a key, two jacks and a battery gage, placed in a removable compartment. The operator's telephone set is connected to the apparatus and battery box by means of a cord, plug and jack. The key operates in two directions and has three positions, neutral, right and left. In the neutral position the batteries are in circuit; when operated one way the batteries are disconnected to save current when the apparatus is not in use, while in the other position the gage is connected across the battery terminals, so that the condition of the cells may be determined. It would be a serious matter after the rescue party had entered the mine to discover that the batteries were too weak for service.

HEAVY CABLE PROVIDED FOR SHAFTS

In many cases it may be found desirable to use cable for carrying the talking circuit down a shaft or into a slope or drift up to the edge of the danger zone. For this purpose a large box, including a cable reel, is furnished. This box is made of ash, heavily reinforced and provided with metal corners. It carries an aluminum reel holding 1300 ft. of specially strong and flexible twisted pair cable, having 30 per cent. pure para rubber insulation, the highest grade obtainable.

A heavy ratchet and pawl are provided to prevent the reel from turning, after enough cable has been paid out. Connections with the apparatus box and the coil carried by the helmet man are effected by means of an aluminum-incased jack and plug, while electrical contact with the inside end of the reeled cable is made through collector rings and commutator brushes connected to a jack.

This entire outfit has been designed and constructed with a view to providing practical and serviceable telephone equipment for mine-rescue parties. Service tests have proved that this object has been attained. This equipment should, therefore, be of incalculable benefit to those engaged in this work, which is at best hazardous.

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Coal Trade at Marseille

Consul General A. Ganlin reports from Marseille, France, in the Consular Reports under date of May 28 concerning the coal trade at that point as follows:

The coal, coke and patent-fuel imports at Marseille during 1912 amounted to 1,470,158 metric tons, being practically equal to those of the preceding year. England furnished 1,101,816 tons, Germany 213,104 tons, and the United States 33,334 tons. The imports of American coal consisted of 15,911 tons of coke purchased by the aluminum factories of the Savoie district, 11,353 tons of steam coal, and 6070 tons of gas coal for the Marseille Gas Co.

An excellent market appears to exist here for American coke, although German competition is very keen in this line. The imports of gas coal have also given entire satisfaction and the inadequate transportation facilities and usually excessive freight rates are the chief obstacles to be overcome in order to secure transactions on a steady and profitable basis. There is always a limited demand for American steam coal in Marseille, but it is chiefly dependent upon industrial conditions in the British coal fields. Coal suitable for the manufacture of briquettes could also be sold in large quantities in this district. French coal is unsatisfactory in this respect, and certain grades of American coal could, in the opinion of competent authorities, replace most advantageously the products now used for this purpose.

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The statement is made, in the Journal of the Chemical, Metallurgical and Mining Society of South Africa, that frozen dynamite or gelatin is very susceptible to fire and easily burnt. It no doubt often happens that the detonator, though failing to explode the frozen sticks of gelatin in the hole, will set them alight, thus causing a burnt-out hole, with the accompanying gases, bad heads and general discomfort to the workmen. A frozen stick of gelatin may also be the cause of a misfire accident, by remaining in the bottom of the hole unexploded, in its frozen state; but thawing out by the aid of the natural rock temperatures, and later being roughly disturbed by an auger when another hole is being drilled, it is fired and an unexpected explosion takes place.

Mine Inspectors' Institute, U. S. A.

By J. T. Beard

SYNOPSIS—The annual meeting of the Mine Inspectors' Institute of the United States of America was held at Birmingham, Ala. No papers were presented. The cordial reception of the citizens of the Iron City of the South contrasted strongly with the chilliness of the weather, which was phenomenal for the sunny South in June.

The Mine Inspector's Institute of the United States of America held its annual meeting, this year, at the Hillman Hotel, Birmingham, Ala., June 10-13. C. H. Nesbitt, chief inspector of Alabama, occupied the chair, and called on Culpepper Exum to make the opening address in which he welcomed the visitors to Alabama. To complete the expression of welcome, W. P. G. Harding, of the Chamber of Commerce, delivered an address on behalf of the city.

Pres. Thomas K. Adams then delivered his address, an abstract of which follows:

The President's Address

This is the fifth annual convention of our Institute and we meet today under auspicious circumstances. We are, in common with all other classes of American citizens, enjoying the fruits of a prosperity never exceeded before in the history of our country, for which we should be thankful. We should feel proud of the fact, too, that in the rapidity of the accumulation of wealth no other nation has excelled us. Few nations can equal us in our enormous territorial holdings, which contain a practically inexhaustible supply of valuable minerals, capable of increasing to fabulous proportions our already acquired $110,000,000,000 of national wealth.

The coal-mining industry has kept step with the marvelous progress and development attained along all other lines of human endeavor. Sixty-three years ago there were produced 7,000,000 short tons of coal in this country, which increased to nearly 550,000,000 in 1912, and in the production of this enormous tonnage 750,000 persons found employment. While the product of the coal-mining industry is not of such large volume and value as compared with that of agriculture which amounts to nine and one-half billions of dollars, nor of the annual output of manufacturers, worth fifteen billions of dollars, yet, as mining men, we are justified in the belief that coal is king and that it is the most important pillar in the structure of the industrial life of this nation. When we realize that our country's industrial greatness has been rendered possible by the ingenuity, industry and organizing genius of our people, we have great reason for rejoicing with all other patriotic Americans.

The Mining Fatality Rates

Our industrial position, however, has been won at a great sacrifice of human life. In the year 1912, 2360 persons lost their lives in and about the mines of this country, or there were 3.15 deaths to every one thousand persons employed, which is 4.29 deaths to every one million tons of coal produced, which means that one person is killed for every 233,000 tons of coal produced. This is the best record we have had since the disastrous year of 1907, in which 690 persons lost their lives by mine explosions. While this record is better than it has been for the past six years it is still entirely too high.

We realize that the miner is engaged in a hazardous occupation, but we are equally agreed that many of the lives lost are an unnecessary sacrifice and not warranted by the hazard of the miner's occupation.

We, as mine inspectors, have greater opportunities for acquiring experience and an intimate knowledge of varied mining conditions and of the best means to eliminate the dangers incident to mine operations, than any other body of men. Furthermore, it is our duty as members of this institute, both in our individual and organized capacity, to blaze the way which will lead to the adoption of such precautionary and remedial measures as shall render the mines safer in the future than they have been in the past.

The people of this country have reason to expect that an organization of this character, composed as it is of experienced and intelligent mining men, will take the initative in securing such uniform and necessary legislation as will safeguard life.

This organization has power to accomplish much good if it has learned how to use that power effectively. If we have not been as potential or as effective in realizing the real purposes of our association, the failure is ours. By well directed efforts, earnest, united and enthusiastic work, we can make this institute a powerful agency for good or we can by our indifference make it a monumental failure. The Institute gives us a medium through which we can talk to the people of this country with a power not possible as individuals. We are also in a much better position to reach the governmental powers and obtain the enactment of reasonable and necessary laws. But these alone will avail us nothing, unless those concerned in the operation of the mines are forcibly required to obey them.

Possible Reductions in the Death Rate

Whenever the mining people of this country sincerely endeavor to eliminate 50 per cent. of the mine accidents they have the power and the knowledge to do so. This much desired result will surely come whenever the captains of the coal-mining industry find that the preservation of human life is a more valuable asset than large dividends; and, when the mine workers themselves have learned the lesson of obedience and found that their lives are more important than the acquisition of a high rate of wages. When this time comes the disastrous problems having such baneful results, will, in a large measure, be solved and eliminated.

We feel that we have good reason for encouragement because, with all our shortcomings, at no time in the history of the coal industry have greater efforts been put forth for the betterment of mining conditions in general with more laws enacted, and better enforcement of the same, than now. The dangerous elements incident to the mining of coal never were better understood; a better knowledge of mining was never so universally diffused and the mines have never been so intelligently managed

as at the present time, yet unnecessary accidents happen, many of which are of great magnitude.

Along with our wonderful progress and development in mining many more dangers have arisen. This is largely due to the introduction of a multiplicity of machinery together with dangerous powers, into the mines, and the inordinate desire to obtain big things by concentration of productive units, thus effecting greater economies. In addition to this there is the great haste of the working men striving to secure a larger tonnage and greater efficiency; this attempt, with the large numbers of unintelligent and unskilled men now employed in the mines of the country accounts for the disastrous results that have followed. In view of such facts much work remains to be done by the mining classes and especially by the mine inspectors before conditions can be secured in the mines that will better safeguard life and reduce the death rate to the proper minimum.

Those of us who had not the experience in the mines of this country before effective mining legislation was enacted can hardly imagine the great improvements in the sanitary conditions of the mines. In fact, we have been creditably informed that such conditions in the large, well regulated mines of this country are unexcelled by those in any other country. While it may be regarded in some quarters that human life is held very cheaply, especially that employed in the mines, yet, were all the adverse conditions with which we have to contend well understood, our death rate would bear a much more favorable comparison with other countries.

Responsibility of the Inspector

Institutions of this character are an absolute necessity in this country. It is the opinion of nearly all intelligent men now, that in order to accomplish the best results in any enterprise, whether of a political, social or industrial nature, success can be attained only through organized effort. We live in an age of organization.

If organization is necessary along political lines and indispensable to secure the general social uplift of society, it is certainly as necessary to the accomplishment of industrial freedom and the betterment of the working conditions. Hence good results will be accomplished through our unified, independent, unrestrained and well directed efforts.

You as mine inspectors deserve well of your state governments. No men in the service have proved themselves to be more efficient or more faithful to public duties; duties well and intelligently performed and done under adverse conditions. Your compensation for the kind of services you render, the hazards taken, and the uncertainty of employment, with no provision made by the state for your future, all show the recompense is shamefully inadequate. The great services you have rendered the state in the past, done silently and unostentatiously, putting into motion with missionary zeal forces having in view the common good of the mine workers, have had splendid effects. These may not have been done in such a demonstrative and spectacular manner as is often the case, yet we know of no single agency in the government service or otherwise that has accomplished more for the real betterment of mining conditions in general than has been done by the organized and unorganized efforts of the humble mine inspectors of this country.

Sessions and Entertainment

It was decided at the meeting that in future the papers about to be read before the Institute be published in pamphlet form before that body convenes so that the discussion will be less extempore than would otherwise be the case.

In the afternoon, in addition to a session for discussion, automobile rides were arranged for the visitors by their hosts. The trip led them to the Highlands, over Mountain Terrace, Cliff Road, and across town to Norwood and then to Fairfield.

In the evening a smoker was given at the Hotel Hillman, while the lady visitors were entertained at the theaters. The weather was ideal for automobiling and the visitors coming mostly from the North and West found the sunny South all that could be desired.

Thursday was wholly devoted to a most enjoyable and instructive trip, which consisted of a 40-mile junket around Docena, Ensley, Edgewater and Bay View. During this trip the members of the Institute and their friends were the guests of the Alabama Coal Operators' Association and the Tennessee Coal, Iron & Railroad Co. The mines and steel mills of the company were visited, and the members were further entertained and refreshed by a barbecue in the woods skirting the lake, and a baseball game between the company team and that of the Jefferson Powder Company.

The T. C., I. & R.R. Co. is to be sincerely congratulated on the success of their efforts to establish and maintain the goodwill and coöperation of all their employees. This has been accomplished, in a remarkable degree, by the untiring efforts and a generous expenditure of funds by the company, in order to give to its employees every advantage of education, physical culture and entertainment. All the camps visited displayed to a marked degree the determination of the company to leave no stone unturned that would assist in maintaining pleasant and profitable relations between employer and employed.

The Institute held a session the same evening, at which time the important question of the use of mixed lights in gassy mines was discussed. The annual election of officers then took place, which resulted in the choice of the following: David J. Roderick (Penn.), president; John Dunlop (Ill.), first vice-president; J. B. McDermott (Mont.), second vice-president; Thomas Morrison (Ohio), third vice-president; J. W. Paul (Penn.), secretary; R. S. Wheatley (Ohio), assistant secretary; R. Y. Muir (W. Va.), treasurer; and J. T. Beard (New York), editor-in-chief.

A brief session was held Friday morning, at which time the following resolution, among others, was adopted:

RESOLUTION

Following an interesting and prolonged discussion of the methods employed in different states, for the selection of mine inspectors, the Mine Inspectors' Institute, U. S. A., in session June 11, 1913, at Birmingham, Ala., unanimously adopted the following:

Resolved—That in view of the nature of the duties imposed by law upon all state mine inspectors, requiring him to act as agent for the state; and because the upright and conscientions performance of those duties often calls for the fearless, unprejudiced and unhampered exercise of an inspector's best judgment and convictions, in the face of threatening opposition of either operators or miners or both: Therefore be it

Resolved—That it is the sense and deliberate opinion of the members of this Institute, that the incumbent of the office of state mine inspector should be, as far as possible,

removed from any influence that would tend to warp his judgment, or embarrass his conclusions, or in any manner delay his action in the interest of safety and security of mining operations under his direct supervision; and further,

Resolved—That, in securing this end, it is the unqualified opinion of this body that the elective system as applied to the selection of state mine inspectors should be condemned unreservedly and abolished. In conclusion be it further.

Resolved—That due publicity be given this action by wide-spread notice in the public press and mining journals, so as to bring it prominently before state legislators and governors, in the hope that such laws may be wiped from the statute books where they exist in any state, or may be killed if contemplated.

By vote of the members present, the next annual meeting of the Institute will be held at Pittsburgh, Penn. It is the purpose of the mine inspectors of Pennsylvania to make this meeting a memorable one in the history of the Institute

Among those who attended the convention were: Charles H. Nesbitt, David Kelso, Frank Hillman, Thomas Roscoe and Mr. Hillhouse, all of Alabama; Thomas K. Adams, Thos. D. Williams, D. J. Roderick and P. G. Moore, all of Pennsylvania; James Martin, L. D. Vaughn, L. B. Holliday, Frank E. Parsons, Arthur Mitchell, R. Y. Muir and H. H. Pinkney, all of West Virginia; George E. Sylvester and John Rose, of Tennessee; F. I. Pearce, of Indiana; Hector McAllister, John Dunlop, Oscar Cartlidge, Thomas Little, W. S. Burris, Thomas P. Back, Martin Bolt and Thomas Moses, all of Illinois; J. D. McDermott, of Montana; J. W. Paul and E. R. Sutton, Federal Bureau of Mines; R. H. Beddow, of New Mexico, and J. T. Beard, senior associate editor, "Coal Age," New York.

Messrs. Bolt, Moses, Burris, Martin, Mitchell, Parsons and Vaughn were accompanied by their wives.

A New Mining Lamp

Ever since the introduction of the incandescent bulb upon a successful commercial scale, it has been the desire of many mining men to utilize this means of illumination in the miner's cap lamp.

Despite the fact that the old oil lamp is both reasonably cheap in first cost and operation, it leaves, nevertheless, much that is to be desired in the quality and steadiness of its illumination. Many experiments and trials have been conducted, therefore, in the attempt to produce a satisfactory and successful electric cap lamp.

Heretofore, practically all of the electric devices of this kind which have been placed upon the market have been of the storage-battery variety which require several hours each day to charge.

After years of experimentation and development, the Maxivolt Primary Battery Co., of 200 Fifth Ave., New York City, will shortly place upon the market their new electric mining lamp, known as the "Bulldog." This is claimed to be the lightest, most compact and most convenient apparatus of this kind ever placed before the mining industry.

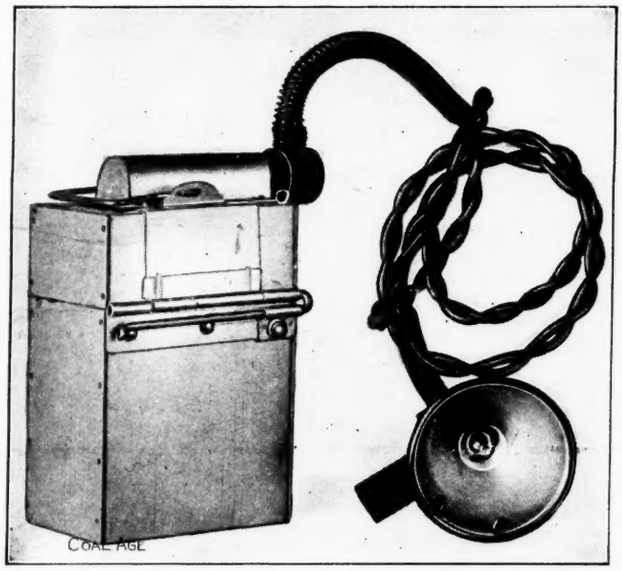
This device is a rather radical innovation in the electric mining-lamp field. It consists of an aluminum-incased primary battery which is carried on the belt. This battery requires a small amount of liquid electrolyte and a small zinc bar about the size of a lead pencil for each day's work. When thus charged, it will deliver a current of 10 amp. at 1.6 volts for 10 hr., producing a steady, clear, unflickering light of 2 cp. throughout the entire period.

The cap lamp proper is a small incandescent bulb carried in a concave reflector which is attached to the miner's cap in the ordinary manner. A carefully insulated double cable leads from the lamp back over the cap and down to the battery upon the miner's belt. At the point where this cable is subjected to the greatest flexure, it is protected by an open coil spiral spring for a distance of approximately 6 in. This prevents the cable from kinking or doubling short with consequent injury to the insulation.

By removing the cable and inserting the lamp reflector direct into the socket of the battery an extremely simple and efficient hand lamp is produced.

This device possesses many advantages which may not be immediately apparent upon a casual inspection. The battery case being made of cast aluminum is light, durable and strong. All connections are efficient but exceedingly simple. No skilled labor is required for recharging the batteries and no generating machinery is necessary at the mine where these lamps are employed.

According to the specifications of the Bureau of Mines, a battery attached to a lamp should not have a short-circuit current of more than 50 amp. at 2½ volts. The maximum short-circuit output of this battery is 18 amp. at 1.6 volts. Assuming that 50 amp. at 2½ volts is just sufficient to produce a gas-igniting spark, it may be clearly seen how remote is the possibility of such an occurrence with a battery of the current strength described above.



CAR LAMP AND ALUMINUM-INCASED PRIMARY BATTERY

The electrolyte used in this battery is harmless and inexpensive and cannot be spilled from the container under ordinary conditions. Both this and the necessary zinc electrodes may be purchased in quantities at small cost. Experiment has proved that this device will give a continuous light of 2 cp. for 10 hr. with an expense not exceeding four cents.

Don't ever cause anyone to receive an electric shock.

Don't think that it is smart to get an electric shock. Every time a man gets a shock it shows lack of care and knowledge.

Don't be ashamed to be careful. You owe this not only to yourself, but to others who may follow your example.

Don't handle wires or electrical apparatus of any kind unless you are told to do so.

Don't get off or on trips from the trolley-wire side.

Don't carry tools on your shoulder when crossing under the trolley wire, or when traveling in the same entry with it.

EDITORIALS

The Danger of Banked Fires

At many mining plants, particularly those of small operations, it is a common practice to bank the fires over night or during periods of light load. This may or may not be a dangerous custom, depending upon the manipulation of doors, dampers and drain pipes.

When green coal is first placed upon the fire, it passes through a process of distillation, the volatile combustible matter being driven off by the heat from below. If the gases thus evolved are not burned upon formation and are not swept away by a circulation through the furnace, they may form with the air present an explosive mixture, which only requires a tiny tongue of flame or a spark to ignite.

The violence of the explosion following an ignition of this kind, or the damage which may result therefrom, depends not only upon the proportion of the gas-and-air mixture, but also upon how thoroughly this mixture is confined within the setting walls. It is seldom that such an occurrence wrecks the brickwork, but it may be, and frequently is, sufficiently forcible to be dangerous, or even fatal to the firemen or other attendants who may be in the proximity of the doors when they are blown open.

When a fire is banked, and doors and damper are closed, the water-column drain or any other steam or hot-water pipe leading into the ashpit should never be opened. Such a procedure forces air through the grate bars and fire bed with more or less violence, and, with the proper mixture of air and gas in the passages and combustion chamber of the boiler is almost certain to result in an explosion of this kind.

It is the part of wisdom, therefore, to never blow down water columns of gage glasses (presupposing that these drains terminate in the ashpit) when the fire is banked. It is better still to make it an infallible rule never to bank the fire when the chimney damper is entirely closed.

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The Financial Outlook

An unmistakable and uniform depression in securities has developed possibilities which are too potent to be ignored. As in the famous panic of 1907, the slump is due essentially to an over-straining of the world's financial reserves, but the cases are not parallel because the present depression has been anticipated to a greater or less degree. Close students of conditions have noted for some time that the investment markets have been congested to such an extent that even old-line standard securities of the most reputable kind could be sold only with difficulty. A notable example of this was the recent flotation of 27 million dollars worth of eight-months' notes, by the state of New York, on an interest basis of about 4.87 per cent. These issues are regarded among the most conservative investments obtainable and heretofore have commanded a substantial premium on an interest basis of 4 per cent.

In the coal industry itself, the money stringency has had the effect of bringing about a rigid restriction in new development. For more than a year it has been well known that some of the most powerful companies in the country have been hard pressed for funds, especially those contemplating extensive new work. While this has naturally caused some temporary embarrassment to those affected, it has perhaps been beneficial to the permanent interests of the trade since it has discouraged the increase of our already excessive capacity.

Apparently, the effect of the tight-money situation has not yet reached the coal markets. Whether it ultimately will do so is a question yet to be solved, and is, of course, dependent on the duration of the present conditions; although, as a fact, the coal trade has seldom been in such a strong position at this season of the year. Shipments in all the principal mining regions are exceedingly heavy and limited only by the labor supply, while prices are unusually buoyant and display a strong rising tendency. The consumption is large and well distributed among the various branches of industrial activity, so that a recession in any one department (as now seems to be impending in steel) should not have any serious effect on the trade as a whole.

Returning again to the money situation, it is interesting to review some of the causes that have led up to the present conditions. The trouble, no doubt, originated with the European wars, although these alone could not have developed such an acute situation as now prevails. Following this came the uncertainty, in this country, because of the tariff revision, and more recently the appointing of receivers for the defunct St. Louis & San Francisco R.R. At about this same time an abnormally heavy flotation of government, state, municipal and corporation securities appeared, which congested the markets and made it clear that credits were over-strained. Notably among these was the announcement of an impending issue of 56 million dollars of German and Prussian government bonds. Since it is mandatory on the German bankers to subscribe for government securities, the necessity of providing the required funds resulted in a heavy liquidation of American issues and was probably the cause for the recent spectacular slump in the Canadian Pacific stock.

Thus it appears that the trouble is due to a combination of untoward and unforseen conditions. The result has been to cause a general retrenchment and establish business on a more equable and sound basis. It has also brought a renewed feeling of confidence, because of the strong resistance offered to a series of conditions that would, on other occasions, have resulted much more seriously. Secretary McAdoo's announcement that the government is prepared to make loans to the extent of 500 million dollars, under provisions of the Aldrich-Vreeland act, had an immediately stimulating effect upon all securities. This removes any possibility of a tight money market when the crop movement starts and has materially relieved the situation generally.

The Sherman Act

We imagine that everyone was grieved to learn that some over-zealous government official was endeavoring to apply the Sherman Act to remedy the evils in the Paint and Cabin Creek districts. The most unfortunate feature is that there is only too much hope that the prosecution may be successful. The public is not in sympathy with any attempt to restrain the formation of unions in places where wages are not equal to those in other industries or even in other centers of the same industry. It will be thought peculiarly reprehensible that such an attempt has been made in West Virginia.

We are not sanguine that any great increase of wages will result from any action of the United Mine Workers of America, still less from the violence of the irresponsible Industrial Workers of the World, but we believe that an attempt to penalize the formation of a union will result solely in the passage of an amendment removing labor organizations and agricultural associations from the operation of such organic law.

The country needs this weapon of defense against attempts like those made abroad to tie up the labor market for purely political reasons, to obtain class legislation or to reinstate some union man whose discharge is dictated by the welfare and safety of the public. This defense is not to be used to victimize men who only seek to procure equal rates of pay with those customary elsewhere.

If any charges are to be made, let them be that the union has promoted violent attacks on the majesty of the law. We do not know whether such charges could be proved, but if they cannot, the courts should not be asked to convict men whose acts could not be proved unlawful and contrary to public advantage.

We are inclined to believe the Union is not in bad hands. Perhaps our judgment is in error, but we are disposed to feel that even in the anthracite region, the will to break contracts is more marked among certain irresponsible miners and inferior organizers than among those who are the head and front of the organization. Certainly the Union is only impatiently tolerating the evil and not encouraging it.

We cannot believe that if both labor representatives and capitalists are proved to have conspired to unionize and raise wages that the public will be disposed to condemn either for that action. Only those whose consummate blindness to public opinion has caused the present trouble could be bewildered enough to overlook the fact that the whole United States is in a league of sympathy with the Union in the present attempt to secure recognition. Whether the miners are getting a living wage or are paying too much for their necessaries of life, whether the mine guards did or did not violate the laws of the state or of common humanity, are points far more debatable.

But while we believe the operators should permit and not attempt in any way to restrain the formation of a union, we do not feel disposed to put the blame upon them of having caused the declaration of martial law. It was not unreasonable for Mr. Glasscock, who was then governor, to advise a recognition of the Union, as we are now doing, but it is distinctly unfair to blame the operators for all these troubles if the only crime they have committed is that of failing to acknowledge the Union. Recognition is not obligatory by law or by moral considerations, but we confess the right to form a Union is a fundamental property of all men and should not be abridged until the powers thus acquired are arbitrarily exercised to the disadvantage of the commonwealth or to the peril of the public.

In 1834, a group of men, known since as the "Six Men of Dorset," were sentenced to seven years' penal servitude for asking unitedly for an increase in wages of one English shilling a week. Fifty thousand men marched to demand their release. In 1912, a monument was raised to these early martyrs of industrial oppression. We thought the matter settled years and years gone by, and that the prison ship "Success" sailed into New York harbor this summer, to hail the fact that such crimes had long ceased. But the proof has all to be demonstrated again that the Caucasian race does not consider it to be a conspiracy to seek with others or for others an increase in pay.

⁂

Mark the Piping

Around mining power plants it is not common to find the various piping systems marked or designated in any way. Aside from the circumstances that the live steam pipes are frequently covered with asbestos or magnesia, and that water-supply pipes are sometimes made of cast iron, the person unfamiliar with the intricacies of the piping system is at an utter loss to know which conductor carries steam, water or air.

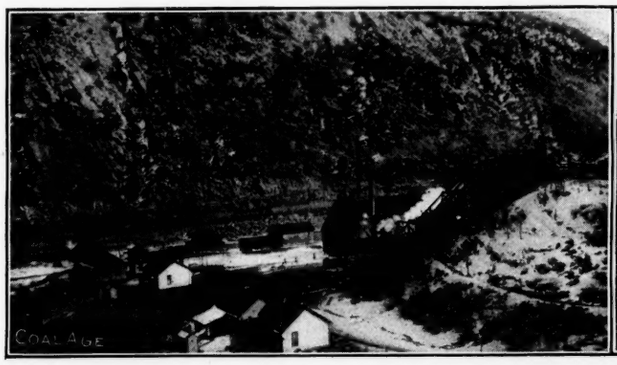
In time of excitement, emergency or accident, even the best of engineers and firemen are liable to become confused; but on such occasions the "greenest man" about the place should not be obliged to hunt around and trace out the logical course of the steam in order to ascertain which valve to close or open to relieve the situation or, perhaps, prevent loss of life.

Various color schemes have been tried and adopted at different plants, any of which are better than no designation whatever, but each leaving much to be desired. Not only are the various colors employed unintelligible to the novice, but they utterly fail to show the direction in which the fluid carried normally flows.

By stenciling upon each pipe at suitable intervals legends stating both the contents and its direction of travel, there need be no confusion as to which particular pipe carries steam and which carries water or air. Such a system of stencils could be easily designed and cut from paper or tin either in the company's drafting room or in the power plant itself. The main steam header as it leaves the boiler room might well be marked "Live (or high-pressure) Steam to Power Plant" followed by an arrow pointing the direction of flow. The same pipe entering the engine room would be marked "Live Steam from Boiler Plant" again followed by the index arrow.

It is, of course, possible that under the ordinary conditions of everyday operation, such a system as above described would have comparatively little utility. But in times of emergency, disaster or danger, the most easily comprehended layout of piping ever devised, if unmarked, can be readily misunderstood and mismanipulated. It frequently happens, also, when human life depends upon the prompt closing or opening of a certain valve, that he who blunders, blunders but once.

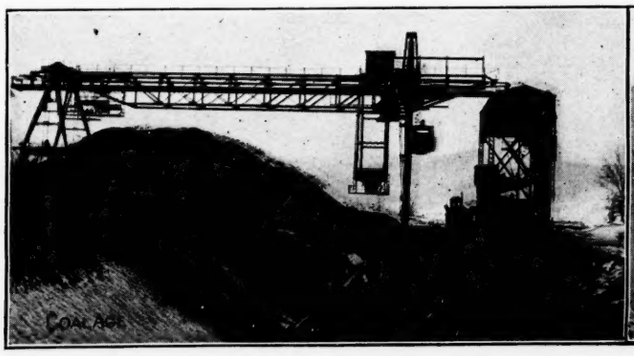
SNAP SHOTS IN COAL MINING



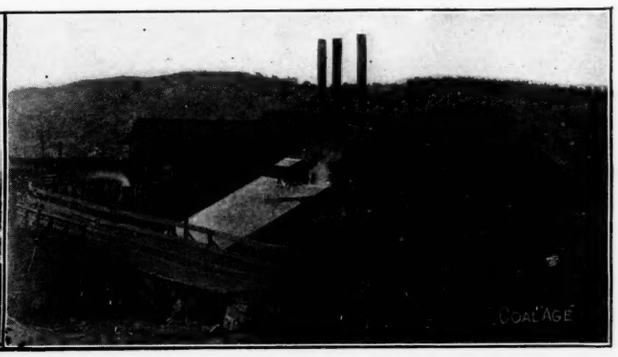
HOUSES, POWER PLANT AND TIPPLE

RESCUE TEAM READY FOR SERVICE

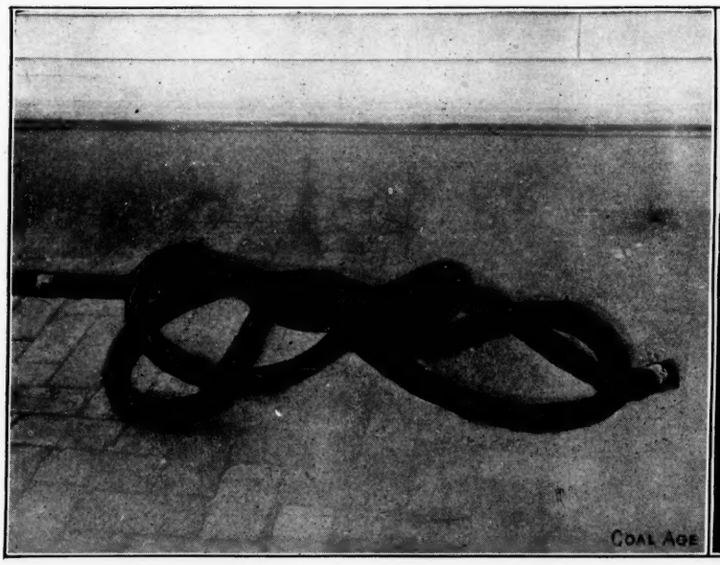
THE SOUTH CAÑON COAL CO., SOUTH CAÑON, COLO.



ELECTRIC CAR DUMPER AND CRANE AT DEDIER-MASCH COKE PLANT OF BETHLEHEM STEEL CO.



TIPPLE AND BOILER HOUSE AT WEAVER MINE, VICTOR AMERICAN FUEL CO.



ROPE WHICH TIED ITSELF INTO A KNOT ON BREAKING AND FALLING DOWN SHAFT

BREAKER AND CULM DUMP AT PACKER, NO. 4, LEHIGH VALLEY COAL CO.

EXAMINATION QUESTIONS

Miscellaneous Questions

(*Answered by request*)

Ques.—(a) How many gallons of water will be contained in a sump 8 ft. wide, 90 ft. long, and 10 ft. deep? (b) How long will it take a pump discharging 80 gal. of water per minute to empty this sump?

Ans.—(a) The cubical contents of this sump is $8 \times 90 \times 10 = 7200$ cu.ft. Its capacity is, therefore,

$$\frac{7200 \times 1728}{231} = 53{,}860 \textit{ gal., nearly}$$

Approximately the same result is found by multiplying the cubical contents by 7.48, since 1 cu.ft. contains 7.48 gal. of water. Thus, $7200 \times 7.48 = 53{,}856$ gal.

Ques.—An engine developed 60 hp., as shown by an indicator card taken when the engine was pulling a load of 3 tons up a shaft 148.5 ft. in depth, in 30 sec. Neglecting the friction of the load or hoist, what is the efficiency of this engine?

Ans.—Disregarding friction, the work performed in each hoist is $3 \times 2000 \times 148.5 = 891{,}000$ ft.-lb. Since this work is performed in 30 sec., or ½ min., the work performed per minute is double this amount, or 1,782,000 ft.-lb. The effective horsepower is then, $1{,}782{,}000 \div 33{,}000 = 54$ hp. The efficiency of the engine, in this case, is

$$K = \frac{54 \times 100}{60} = 90 \textit{ per cent.}$$

Ques.—Find the safe working load of a ¾-in. extra-strong, cast-steel hoisting rope, having six strands and nineteen wires in each strand.

Ans.—The breaking load of a 1-in. extra-strong, cast-steel hoisting rope of six strands and nineteen wires is 39 tons. Then, since the load a rope will carry varies as the square of the diameter of the rope and using a factor of safety of 5, the safe working load for a ¾-in. rope of this kind is

$$L = \frac{39\,d^2}{5} = \frac{39 \times 0.75^2}{5} = 4.39 \textit{ tons}$$

Ques.—The belt wheel on a dynamo is 2 ft. in diameter and should be run at a speed of 600 r.p.m.; the belt wheel on the engine is 14.5 ft. in diameter. At what speed must the engine run to produce the required speed in the dynamo?

Ans.—The speed of two belt-connected wheels, disregarding any slip of the belt, varies inversely as their diameters. In other words, the speed ratio is equal to the inverse diameter ratio. In this case, calling the required speed x

$$\frac{x}{600} = \frac{2}{14.5}$$

$$x = \frac{600 \times 2}{14.5} = 82.75 \textit{ r.p.m.}$$

Ques.—What precautions are necessary in the installation, use and operation of electricity in mines, to safeguard the employees and preserve the property?

Ans.—The bituminous-mine law (Art. 11), specifies clearly and in detail the requirements in regard to the installation of electricity in mines. When electricity is to be installed in a mine, the work should be in charge of an electrician who is competent and familiar with the requirements of the law. The principal precautions to be taken relate to the size and power of the electrical apparatus, the insulation of the wires, the limitations of voltage to be used for different purposes, the proper grounding of metallic coverings, frames and bedplates of generators, transformers and motors, and the proper arrangement of switchboards and other necessary apparatus, and the safeguarding, by suitable means, of all places where men or animals are liable to come in contact with live wires. As far as practicable, power lines should not be installed on traveling ways and suitable danger signals should always be placed at points where these wires are exposed. The wiring should be such as to avoid, as far as possible, the risk of the ignition of gas by sparking, or the ignition of timber or other combustible material, by the short-circuiting of wires.

Ques.—How many horsepower will it take to pull a trip of 20 loaded cars up an incline 400 ft. long, in one min.; the weight of coal in each car being 3000 lb., and the weight of each empty car 900 lb.; the resistance of the rope and pulley being 13 per cent. and the grade 7 per cent.?

Ans.—The weight of the loaded trip is 20 (3000 + 900) = 78,000 lb. The inclination being small, the pull on the rope, due to the weight of the loaded trip on the incline, is found by multiplying the weight of the loaded trip by the percentage of grade; thus $78{,}000 \times 0.07 = 5460$ lb. To this must be added 13 per cent. to cover the resistance of the rope and pulleys; thus, $5460 \times 0.13 = 709.8$, say, 710 lb. This makes the total pull on the rope, due to the weight of the loaded trip on the incline and the resistance of the rope and pulleys, $5460 + 710 = 6170$ lb. Since this pull is exerted through a distance of 400 ft. in one min., the work performed is $6170 \times 400 = 2{,}468{,}000$ ft.-lb. per min. The effective horsepower is, therefore $2{,}468{,}000 \div 33{,}000 = 74.8$, say 75 horsepower.

Ques.—The anemometer makes 120 r.p.m., in an airway that measures 8 ft. 6 in. at the top, 10 ft. 6 in. at the bottom, and is 7 ft. high; what is the quantity of air passing per minute?

Ans.—The section of this airway is a trapezoid. Its average width is one-half of the sum of the widths at the top and bottom of the airway, respectively; or 9 ft. 6 in. = 9.5 ft. The area is then $9.5 \times 7 = 66.5$ sq.ft. The anemometer is calibrated so that one revolution of the vane corresponds to 1 ft. of air-travel, and 120 r.p.m. indicates a velocity of 120 ft. per min., in the air current. In ordinary mining practice, it is not customary to make any correction of the anemometer reading; but this is taken to indicate the actual movement of the air, in feet. Assuming this is an average velocity of the air current, the quantity of air passing in this airway is $66.5 \times 120 = 7980$, say 8000 cu.ft. per min.

DISCUSSION BY READERS

Textbooks in Mining Examinations

Having read a few of the interesting and instructive letters that recently appeared in COAL AGE, in regard to education in coal mining. I want to say that I do not favor allowing candidates the use of textbooks in any examination held for the purpose of determining their proficiency to act as mine foreman or fireboss.

I have two good reasons for my opinion:

First, if a person is anxious to pass the examination and to obtain a certificate making him eligible for appointment as mine foreman or fireboss, he should be willing to give a part of his time to learn the most common formulas relating to haulage, drainage and ventilation.

Second, if textbooks were allowed candidates in examinations, the man who had a fairly good college education and knew nothing about mining practically would have a better chance to pass the examination than the practical mining man who had only a fair education but understood mining from a practical standpoint.

It is claimed by those who advocate the use of textbooks that many good mining men fail to pass the examination because they are unable to memorize the formulas required. I believe all mine foremen should be able to memorize the simple and common formulas used in mining problems. Only such questions as are considered thoroughly practical should be given.

In order to illustrate what in my opinion is not a practical question, I will quote the following question, which was given at a mine foreman's examination a few days ago.

A lever 15 ft. long is used to lift a wagon of three tons' weight. The force exerted on the end of the lever is 200 lb. Find the position of the fulcrum, neglecting the weight of the lever.

I consider this not a practical question, because not a mine foreman in existence would take the trouble to figure out the position of the fulcrum in such a case, but would proceed at once to lift the car on the track as easily as possible. The position of the fulcrum would be governed by the available power and other conditions close at hand.

B. F. STRALIN.

Seanor, Penn.

Conditions re Cincinnati Mine

I have read with interest the article* by John Verner, referring to conditions in the Cincinnati mine.

Mr. Verner refers there to the increased circulation provided later in this mine, as contributing directly or indirectly to cause the explosion. A new fan had been later installed at the Cincinnati mine, and the volume of the air current was thereby increased to 120,000 cu. ft. per min. According to his statement, Mr. Verner believes that this increase of air had a tendency to cause the explosion. I note also that Mr. Hutchinson, referred to in the same article, is quoted as saying that the slowing down of the fan when exhausting had the effect of increasing the pressure throughout the mine and this increased pressure checked the inflow of gas for a time.

My experience has always been the reverse of what is here claimed; namely, when the fan was slowed down, more gas was released and found its way into the mine. My maxim has always been "Keep a good circulation going and conduct the air right to the working face. If anything goes wrong with the fan, withdraw the men at once."

Referring to mine operators and owners, permit me to say that I believe they have done and are doing all that lies in their power to eliminate accidents in and about the mines. The remainder is up to the mine foremen, firebosses and other assistants. These men know the law and should see that it is fully carried out. If this is done, great results may be expected. Impress upon every mine worker the importance of living up to the law, and I believe this will have a great tendency to reduce mine accidents. I wish COAL AGE good luck in the work it has undertaken.

THOMAS STOCKDALE,
Vivian, W. Va. Fireboss.

[In order to avoid confusion of ideas and unnecessary questions and explanations, we would draw attention to the fact that if the fan is exhausting air from the mine, the mine is ventilated under a pressure below that of the atmosphere, and when the fan is slowed down, the mine pressure is increased to that of the atmosphere, which would cause the outflow of gas into the mine to diminish.

On the other hand, if the fan is blowing air into the mine, the mine is ventilated under a pressure above that of the atmosphere. In this case, if the fan is slowed down, the mine pressure falls and the outflow of gas from the strata into the mine is increased. The statement in regard to the outflow of gas from the strata, therefore, depends on whether the fan is exhausting or blowing.—ED.]

Conditions Then and Now

I was much interested in reading the article, COAL AGE, May 31, p. 855, relating to the conditions 40 years ago as they existed in bituminous mines. At that time, most, if not all, of the bituminous mines in Pennsylvania were at or above the drainage level, and, in most cases, extended only a few hundred feet from the outcrop, with a small amount of cover. When pillars were drawn, the overlying strata naturally broke to the surface, permitting the free escape of any gas from the strata. Mines worked under these conditions naturally require the circulation of less air under a low water gage.

At the present time, many of the mines have penetrated the hills to a great distance; and, in some cases, the workings lie far below the drainage level. The worked-out and abandoned areas have also greatly increased in size. As a consequence, a larger amount of gas is given off in both the old and new workings, and pockets of gas

*Coal Age, May 31, p. 855.

are liable to be tapped by the live workings. A larger number of men are employed and a greater amount of explosives used in blasting the coal. These conditions require a larger amount of air to be circulated in the mine. To maintain the circulation of a larger air volume through longer airways requires a greater ventilating pressure than was formerly necessary.

The mining machines so largely used in mines of the present day produce more fine dust than was formerly made in pick mining. The improvements in mining to which I have referred have therefore added at least three dangers that did not formerly exist to the same extent; namely, the high velocity and pressure of the ventilating current, and the fine coal dust produced in machine mining. I believe, as has been pointed out, that the explosion of gas, or a blownout shot, causes a greater disturbance of the air under a high ventilating pressure, and more dust is thrown into the air current and carried further because of the high velocity of the air.

In my opinion, all mines where explosive gas is liable to be encountered should be worked exclusively with approved locked safety lamps and the miners thoroughly instructed in the use of same. Only permitted explosives should be used for blasting and all places should be examined before a shot is fired.

BENJAMIN HARTILL.

Johnstown, Penn.

Explanation

My attention has been attracted to an article on "Calculating Electrical Currents," COAL AGE, May 31, p. 857. Inasmuch as this inquiry comes from Michel, B. C., and is signed "Electrician," it might be taken as emanating from me, since I am the electrician in charge of the electrical plant of the Crow's Nest Pass Coal Co., at this point. I desire to state that the question submitted to you was not sent by me.

A. R. STACEY, Electrician-in-Charge,
Crow's Nest Pass Coal Co.

Michel, B. C., Canada.

[The inquiry referred to above came from one of our subscribers at Michel, who is interested in the study of electricity and, as the sender did not wish his name to appear, we signed the inquiry "Electrician," as is commonly done in such cases. A simple, clear answer was given to the question, as it relates to direct current, which the comparatively low voltage would warrant us in assuming. We think our present correspondent should give himself no uneasiness, owing to the simple nature of the question; as one capable of assuming charge of an electrical plant would not naturally ask for such information, and the term "electrician," as here used, refers only to one interested in electrical matters. We are glad, however, to give space to the above explanation.—ED.]

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

FLOW THROUGH CONDUITS

The flow of fluids (air, water, etc.) through conduits of any kind is governed by the same laws as the flow through orifices, previously explained. The flow is caused by a certain head or pressure, which overcomes the resistance due to friction in the conduit and creates the velocity of the flow.

Bernouilli Theorem—The law established by Bernouilli applies alike to the flow of all fluids. The principle of this law may be briefly stated as follows: In the flow of all fluids, the algebraic sum of the gravity or pressure head, the resistance head and the velocity head is zero.

The gravity or pressure head always acts to produce the flow and is therefore positive (+), while the other two heads, the resistance and velocity heads, each acts to oppose the flow and these are therefore negative(—). Hence, the law that governs the flow of fluids may be stated simply as follows: The sum of the friction head and the velocity head is always equal to the gravity head.

Formulas Expressing Flow—The following formulas are necessary to express the flow in pipe conduits. It is important in combining formulas to reduce the elements to the same denomination. Let

H = total head producing flow (ft.);
h_v = velocity head (ft.);
h_f = friction head (ft.).

Then $$H = h_v + h_f \qquad (1)$$

Formula for Velocity Head—The formula expressing the portion of the head absorbed in producing a given velocity is developed as follows: Let

g = value of gravity (ft. per sec.); G = discharge from pipe (gal. per min.);
v = velocity of flow (ft. per sec.); d = diameter of pipe (in.);
Q = quantity of flow (cu.ft. per min.); a = area of pipe (sq.ft.).

Velocity due to head h, $$v = \sqrt{2gh} \quad ft.\ per\ sec. \qquad (2)$$

Head producing velocity v, $$h = \frac{v^2}{2g} \quad ft. \qquad (3)$$

Quantity of flow, $$Q = 60\,av \quad cu.ft.\ per\ min. \qquad (4)$$

Area of pipe, $$a = \frac{0.7854\,d^2}{144} \quad sq.ft. \qquad (5)$$

Discharge of pipe, $$G = \frac{1728\,Q}{231} \quad gal.\ per\ min. \qquad (6)$$

Combining these equations gives the following:

Velocity head, $$h_v = 0.0026\frac{G^2}{d^4}\,ft. \qquad (7)$$

Example—What portion of the head will be absorbed in producing the velocity only, when a 3-in. pipe is discharging 200 gal. of water per minute?

Solution—

$$h_v = 0.0026\,\frac{200 \times 200}{3 \times 3 \times 3 \times 3} = 1.28\,ft.$$

The Coal Age Pocket Book

Friction in Conduits—The frictional resistance of conduits is due to the rubbing of the fluid on the inner surface of the conduit, which is called the "rubbing surface." The amount of friction developed depends on three factors: the extent of rubbing surface (s); the velocity of the current (v); and the coefficient of friction (f), as expressed by the formula

$$R = fsv^2$$

Pressure Equals Resistance—The pressure producing flow in a pipe conduit is the total pressure (pa) exerted on the entire sectional area of the pipe, and is always equal to the resistance it overcomes; or R = pa, and therefore,

$$pa = fsv^2$$

and $$p = \frac{fsv^2}{a}$$

Formula for Friction Head—If the length of the pipe is l, in feet, and its diameter d, in inches,

$$\frac{s}{a} = \frac{l\pi\left(\frac{d}{12}\right)}{\frac{\pi}{4}\left(\frac{d}{12}\right)^2} = \frac{48\,l}{d}$$

But, the head corresponding to a given pressure is found by dividing that pressure in pounds per square foot, by the weight (w) of 1 cu.ft. of the flowing medium (water = 62.5 lb.). Making these substitutions in the above formula for pressure, and reducing gives finally for the pressure or friction head (assume f = 0.01)

$$h_f = \frac{f\,l\,G^2}{8\,d^5} = \frac{l\,G^2}{800\,d^5}$$

Discharge of Pipe Line—In a pipe line, the quantity of water discharged depends on the gravity head (h) and the length (l) and diameter (d) of the pipe. Since the gravity head is always equal to the sum of the velocity head and the friction head; or $h = h_v + h_f$, we write

$$H = 0.0026\frac{G^2}{d^4} + \frac{l\,G^2}{800\,d^5} = \frac{G^2}{d^4}\left(\frac{2.08\,d + l}{800\,d}\right)$$

$$G = d^2\sqrt{\frac{800\,d\,h}{2.08\,d + l}}$$

When the diameter of the pipe in inches does not exceed its length in hundreds of feet the velocity head may be disregarded, with an error not exceeding 1 per cent.; and the formula then becomes

$$G = d^2\sqrt{\frac{800\,d\,h}{l}} = 28.28\,d^2\sqrt{\frac{d\,h}{l}}$$

The quantity of water discharged (Q), in cubic feet per minute, is likewise given by the formula

$$Q = 3.78\,d^2\sqrt{\frac{d\,h}{l}}$$

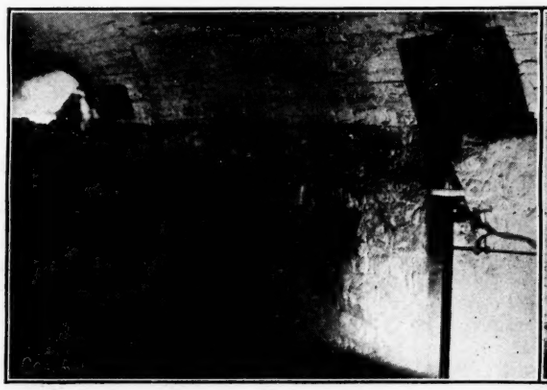
SOCIOLOGICAL DEPARTMENT

H. C. Frick Welfare Plans

SPECIAL CORRESPONDENCE

Sanitary drinking fountains, both underground and on the surface, are an innovation at the H. C. Frick Coke Co.'s plants. The first of these was installed at the Lambert plant, near Uniontown. The drinking bowl consists of a reducing coupling, 8 in. in diameter, such as can be found about any plant. It is supported by a 3-in. pipe, inside of which a smaller pipe is placed which carries the water supply. The space between the standard and the supply pipe serves as a drain.

The fountain could be arranged to flow continually, but in those now in use whistle valves inverted and worked with a foot pedal start the water flowing. All mines of the H. C. Frick Coke Co. will, in a short time, be equipped with similar devices. They furnish the men an opportunity to drink during working hours without putting their lips to cups which have been contaminated by the lips of others.



SANITARY DRINKING FOUNTAIN UNDERGROUND

A 20-FT. "SAFETY FIRST" BRICK SIGN

The same company is preparing to inaugurate a visiting-nurse system at its various plants. The experiment has only been tried, so far, at Lambert and Hecla; but it has been so successful, that it is probable that the experiment will be tried elsewhere, and the practice may be extended to all the mines of this company. The nurses will work in conjunction with the company's physicians and will be under their direction. They will make daily reports of all cases under their care to the superintendents of the various plants.

The value of this system to the workers and their families can hardly be estimated by one who is not familiar with the class of people who are employed in the coke region. They are mostly foreigners who are unacquainted with the health needs of their families. It is the intention that these nurses shall not only take care of the sick, but also shall instruct the employees in personal cleanliness and hygiene.

Superintendent H. W. Boyd, of the Lambert plant, has erected the immense "Safety First" sign shown in the illustration. It is built on a hillside and is on a raised mound. The letters are of brick 20 ft. high and whitewashed.

Welfare Work in Coal Mining

BY W. H. DROLL

The Alabama Mine Operators' Association has banded together to study the sociological question and the sanitation of mine camps and the Tennessee Coal, Iron and Railroad Co. is a leader in promoting every form of mine betterment. Where other institutes and mine operators' associations have made the technology or the profits of the industry their aim, the Alabama organization has laid all stress on the advantage to the employer, of a due recognition of his social obligation.

All the Northern cities are planning playgrounds and we are as active to introduce them into our villages. We have our civic centers, with churches, schools, public dance pavilions, uptodate commissaries, sanitary closets, electric-lighted houses, and it won't be long before our mining camps will have a central heating plant. Nearly all of them have their own "first-aid teams," which meet to compete once a year, for prizes given by the company.

These companies are not doing this work for purely charitable purposes. The miner is independent and is willing to pay for what he gets and does not seek charity. These model mining camps, these first-aid teams and awards for proficiency, these competitions between tenants and prizes for the cleanest house and the best garden are not instituted for charity, but as a business proposition. Keeping the miners healthy increases the production and reduces to a minimum what are termed overhead charges and fixed expenses. The companies figure that the employees who are to mine 25 to 30 millions of tons of coal a year must be healthy men and must be kept in the best possible condition.

No. Sanitation is not charity; it is a business proposition. Do you think it pays?

COAL AND COKE NEWS

Washington, D. C.

Since the departure of the Senate committe charged with the duty of investigating the West Virginia coal strike situation there has been a renewal of the attempt to jockey with this investigation, making capital out of the subject and preparing to use the developments in speeches and discussions on the floor of the Senate. There has been little surprise here over the news that has come back from the place where the inquiry is proceeding as the information has been expected to run in substantially the way that has actually been the case.

The legal experts in congress are now taking the view as was expected that there is really nothing that can be done by the Senate no matter what may be ascertained in this inquiry and that, therefore, the sooner it ends the better. A good many senators now think that it was a great mistake to go into it at all. The same issue had to be met at the time of the Lawrence textile strike and was then decided adversely to Congressional interference. The present action it is conceded sets a bad precedent and is likely to result in dragging congress into many local squabbles.

The situation in the West Virginia case has however tended to concentrate attention upon the plan for extending the operation of the Erdman Act which was drafted by the national civic federation and was this week brought to Washington by Seth Low. The plan follows the lines made familiar a year ago, but is not likely to get much attention this session of Congress.

Recent Coal-Rate Decisions

In the Connellsville Coke Producers Association case against the B. & O. and other railroads reductions from 4 to 10 per cent. on coke in the present rates were last week ordered to take effect on Aug. 1 to Youngstown, Canton, Cleveland and Toledo, Ohio, North Cornwall, Robeson, Reading and Philadelphia, Penn., Baltimore, Md. and Newark, N. J. The decision, written by Chairman Clark, held to be reasonable the present relationship of rates as between the Connellsville district and the Fairmount district in West Virginia. The roads were ordered to maintain this relationship between the rates. Furthermore, the commission held that participation by the roads in through rates of the West Virginia and Tennessee fields which yield lower earnings per ton-mile than their rates from the Connellsville field is, under the conditions of competition between carriers which the defendant roads cannot control, neither unduly discriminatory nor unduly preferential.

In the case of the Youngstown Sheet & Tube Co. and others against the Pittsburgh and Lake Erie R.R. the commission ordered the rate of $1.35 per net ton on coke from the Connellsville district to points in the Mahoning Valley of Ohio reduced to $1.20. The new rate is to take effect Aug. 1.

In the cases of the Wisconsin Steel Co. against the Pennsylvania R.R. and other roads and the Inland Steel Co. against the Pittsburgh & Lake Erie and other roads the commission sanctioned the present rate of $2.50 per ton from the Connellsville region to Chicago.

The Interstate Commerce Commission has handed down an opinion in the investigation and suspension of rates on coal to Milwaukee and other Wisconsin points as follows:

Soft coal originating on the lines of certain of the defendant carriers and destined to points beyond Milwaukee, Manitowoc and Kewaunee, Wis., has, for 10 or more years, moved over the across-lake routes to those points at the Chicago rates. By the tariffs under suspension the carriers undertook to close certain of the routes and cancel the rates applicable to them because of a failure to arrive at agreements following a demand on the part of thhe delivering carrier for an increase in its division; Held, That the suspended tariffs must be withdrawn and the present routes kept open. An advance of 10c. per ton in the rates is permitted.

HARRISBURG, PENN.

A bill which empowers all municipalities in the anthracite region to enact ordinances, by-laws or rules prescribing all needful regulations for the mining of coal beneath such municipalities has passed both houses. It also allows councils to create bureaus of mine inspection, to consist of one practical mining engineer and whatever assistant he shall need, to be fixed by councils and approved by the chief executive. The latter has the power to appoint the mining engineer, and his assistants, the salaries of all to be fixed by the councils. Members of the bureaus are given the right to enter all mines which have workings beneath their respective municipalities. All mine owners or operators are required, within three months of the passage and approval of the ordinance to furnish to the bureaus accurate maps and plans of all their workings beneath such municipalities. They must also, every three months, furnish to the bureaus new maps showing all the extensions of their workings beneath the municipalities since the last map was furnished.

Operators must not remove coal, rock or earth from beneath any street, avenue, thoroughfare, court, alley or highway without having first constructed sufficient adequate permanent artificial support to maintain the surface of such highways, etc

Violaters of any of the provisions of this act are subject to a fine of $1000 or imprisonment for one year, or both at the discretion of the court.

The provisions of the bill are made severable and, in the event that one of them may be declared unconstitutional, such a decision will not affect the validity of the remaining provisions.

PENNSYLVANIA

Anthracite

Pittston—The Henry colliery of the Lehigh Valley Coal Co at Plains resumed work June 9, after an idleness of a week. The shutdown was due to a strike caused by the invasion of the Industrial Workers of the World in this neighborhood and the consequent desertion from the ranks of the United Mine Workers. It is said, however, that the 900 men have now taken up their tools with the expectation that the difficulty will be adjusted speedily. The opposition to the Industrial Union is still bitter, and the resumption of work does not necessarily mean a cessation of hostilities.

The preliminary meeting of many of the first-aid teams of the South Pittston district of the Pennsylvania Coal Co. to choose a team to represent the district at the interdistrict meet at Valley View Park, in the fall, was held in the Y. M. C. A. at Pittston. A total of thirteen teams participated in the contest. The judges were John Huntley, of the North Pittston district, and Moses Ballentine, of the Old Forge district, and the timekeepers were Isaac Benjamin and William Coplan.

Philadelphia—The Central Labor Union of this city has voted against the state-wide strike proposed by President Morrow, of the State Federation of Labor. It is also understood that delegates to the Central Labor Union convention at Harrisburg, coming from the northeastern part of the state, will also vote against the state-wide cessation of work.

Sugar Notch—It is expected that the Hadleigh colliery of the Pittston Coal Co., which was closed down last fall to allow of the construction of a new breaker, will reopen during this month. This colliery employs about 300 men and boys.

Wilkes-Barre—The South Wilkes-Barre colliery of the Lehigh & Wilkes-Barre Coal Co., recently lost one day as the result of an unofficial strike, which affected about 1200 employees. This strike is probably the first unintentional strike that ever occurred in this region. According to the union officials, the men remained away from work under the impression that the local with which they are connected had called a "button" strike. This was not the case.

At the last pay day, a committee of five men took their position at the head of a shaft where they were to collect back dues from about 100 miners, who would then receive buttons. A number of workmen on their way into the mine were encountered by the officials with the buttons, and when asked to show their due books, came to the conclusion that a button strike was being called. Going back to the entrance to the colliery they informed the incoming men of their idea of conditions, with the consequence that the workmen did not report for work.

There was a button strike at the South Wilkes-Barre colliery on Nov. 1 last, when all of the employees were officially called out, and the colliery was tied up for some time.

Bituminous

Johnstown—The business section of the mining town of Bens Creek was entirely wiped out by a fire June 11. The damage is estimated at from 150,000 to $200,000. The town is the center of large coal operations; among the largest are the Pennsylvania Coal & Coke Co., Juniata Coal & Coke Co., and the Lilly Coke Co.

WEST VIRGINIA

Wheeling—A strike has been declared at the Pursglove mine at St. Clairsville as a result of a dismissal of an employee. Subdistrict officials of the United Mine Workers ordered the men to return to work, but they refused. About 250 are out.

Huntington—The Band mill, owned by the United States Coal & Oil Co., at Holden, W. Va., was destroyed June 10 by fire. The total loss is $30,000.

Terra Alta—As the result of the mysterious destruction of the Righter Coal & Coke Co.'s blacksmith and machine shop, at its plant on Long Creek, Sheriff R. F. Stout has stationed a posse of deputies at that point to prevent any further increase of 15c. a car for digging coal. This is the first strike trouble in this section for many years.

Charleston—General Chas. D. Elliott, of West Virginia, who was in supreme command of the military in the strike zone, was called as a witness by the United States Senatorial Committee, which is investigating the coal miners' strike in this region. General Elliott declares that martial law was heard by the strikers themselves and the United Mine Workers' officials; while the coal operators protested both to him and the governor against the issuing of such a proclamation.

MARYLAND

Cumberland—An attempt was made June 7 to organize the miners of the Georges Creek region at a big labor meeting in the public square at Cumberland. The meeting was addressed by John P. White, president of the United Mine Workers of America, and other labor leaders. The miners in this region are said to number over six thousand.

OHIO

Alliance—A consignment of powder exploded June 16 at the Jefferson mine No. 2 at Fineyfork, fatally injuring four men; eight others were seriously injured. The Jefferson Coal Co., of Cleveland, Ohio.

Steubenville—Three miners were killed June 14 by a serious fall of slate in the Dunglen mine.

ILLINOIS

Springfield—Fire at the Royal Colliery Co.'s mines near Verden caused a loss which is estimated at more than $100,000. The upper works, washery and shaft timber-works were destroyed.

Marion—Fire is sweeping the underground works of the Carterville district mine. The loss is estimated at $100,000.

Herrin—The engine and boiler houses of the St. Louis Carterville Coal Co., which were recently destroyed by fire, are to be replaced at once. Arrangements will be made so that the Burlington will be enabled to get its track in at this mine, which was impossible before on account of the location of the engine room.

Royalton—After several months' strike at the south mine, the miners have returned to work. They contended that the new company should pay them the wages that the old bankrupt company owed them, and the matter has been settled, but details were not made public.

Marion—The Illinois Hocking mine, which caught fire on May 22, has been sealed up, inasmuch as the fire got beyond the control of the men. The question of flooding the mine has been discussed.

Desoto—The mine of the Kreikemeier Coal Co. has suspended operations indefinitely. This company is involved to a considerable extent with the Mississippi Valley Fuel Co., of St. Louis, for which a petition in bankruptcy was recently filed.

ALABAMA

Birmingham—Rumors are prevalent that the coal miners in the Birmingham district are likely to strike this summer. A statement was made at the headquarters of the United Mine Workers of America, Alabama District No. 20, that no strike has been ordered, and so far as the organization was concerned, nothing of the kind was under consideration. It is not denied, however, that efforts are being made to bring about a general reorganization of the coal miners.

TRADE CATALOGS

Electric Service Supplies Co., Philadelphia, Chicago and New York. Catalog on Protected Rail Bonds and Appliances. 1913 Edition.

This is a handsome book of 72 pages, and covers the subject of rail bonding in its every phase. It is beautifully illustrated and besides showing every practical type of Rail Bond, it illustrates clearly the value of proper installation, the importance of accurate testing apparatus, and the use of bond compressors.

To the users of rail bonds this book is more than simply a catalog, it is a treatise on rail bonding in general and will prove a wonderful aid to operating men in selecting from the hundreds of different types of bonds one that will exactly suit any special requirement.

The section of this catalog describing and illustrating proper methods of installing Rail Bonds enters into the subject in detail and shows graphically the importance of assuring a perfect, moisture-proof contact with the rail.

From cover to cover this book will prove of interest to the 3000 operating men to whom it is being sent.

PERSONALS

Edward H. Coxe, of Birmingham, Ala., former general superintendent of coal mines and coke ovens for the Tennessee Coal Iron & R.R. Co., has been appointed general superintendent of the LaFollette Coal Iron & Ry. Co., with headquarters at LaFollette, Tenn., effective June 12, 1913.

Harry Sharp, formerly superintendent of the Barton mine of the Youghiogheny & Ohio Coal Co., has resigned to accept a position with the Davis Coal & Coke Co., at Thomas, W. Va. This company owns more than 100,000 acres of coal and operates 29 mines.

Chas. B. McNaught, of Reed, Shaw & McNaught, has been appointed president of the Sterling Coal Co., Ltd., and also president of the Conger Lehigh Coal Co., Ltd. In the first instance Mr. McNaught takes the place of W. F. Tye, who will still remain a director of the company. In the second case, he takes theh place of R. E. Gibson, who has become vice-president.

CONSTRUCTION NEWS

Lansford, Penn.—The Lehigh Coal and Navigation Co. is planning to erect a breaker at No. 11 near Lansford.

Albia, Ia.—Harris Brothers have leased 1000 acres of land south of Albia and will open a new coal mine between Albia and Moravia.

Wilkes-Barre, Penn.—Excavations were commenced recently for an engine house to be built at the Maderia Hill Colliery near the new slope on Scotch Hill.

Ashland, Penn.—Work on the new Lehigh washery to be erected on the site of the old Bowman breaker has been commenced, Wheeler and Reilly, of Luzerne, have the contract for the work.

Punxsutawney, Penn—Another coal mine will be opened soon in Furnace Run, along the Allegheny River, where over 500 miners will be employed. There are at present about 500 miners employed in the other coal mine at Furnace Run.

Birmingham, Ala.—The new steel tipple and concrete washer at the Banner mines of the Pratt Consolidated Coal Co. will be soon finished and put into use. It will permit of an increase in production to at least 1200 to 1500 tons daily.

Williamson, W. Va.—Mingo County is on the verge of the biggest coal and gas boom in the history of the county. Over 50,000 acres of coal and gas land on both sides of county are being prepared for opening within the next six months.

Lexington, Ky.—It is said that the Baltimore & Ohio Railroad Co. proposes to construct another coal railroad in Kentucky and has acquirad the charter rights of the Long Fork Railroad Co., which owns the location on the left fort of Beaver Creek.

Whiteburg, Ky.—The Consolidation Coal Co., of Lexing-

ton, Ky., has started to build a large hospital, which will take the place of the temporary hospital built a year ago. This will be the largest in eastern Kentucky, and will cost in the neighborhood of $30,000.

Pomeroy, Ohio—Two new coal tipples are to be constructed this summer on the line of the Middleport & Northwestern Ry. The Stalter & Essex Coal Co. will erect a tipple on the Kers place, and the Sherman-Essex Coal Co, will construct a tipple on the O. L. Bradford farm.

Birmingham, Ala.—Announcement was made of the opening of a new coal mine, at Pierceville, Jackson County, with a proposed daily capacity of 1000 tons. The new mine is to represent working of 23,000 acres. Grading work on nine miles of narrow gage track is now under way.

Bristol, Va.—It is understood that Chas. H. Hagen will buy the Hagen property comprising 30,000 acres of coal land in Scott county for immediate development. Mr. Hagen controls water power which will be developed to transmit electricity for mining more than 2,000,000 tons of coal annually.

Mauch Chunk, Penn.—It is understood that the new electric plant of the Lehigh Coal & Navigation Co., which is now under consideration at Hauto, will not be completed in July as originally expected. Various delays will make it impossible for the contractors to complete the work until probably late in October.

Vincennes, Ind.—The American Coal and Mining Co., organized at Brazil some time ago and which purchased a large acreage of coal land in Knox County near Bicknell, is preparing to sink two mines on the land at once. W. H. Zellar, as president; W. J. Snyder, secretary-treasurer; Hal R. McClelland of Clinton, vice-president.

Pomeroy, Penn.—The Calvin-Essex Co., of the Hocking Valley proposes to open a large mine near the Avenue Bridge, on Thomas Fork, which will be connected with the K. & M. R.R. by a spur up the creek from Bradbury. J. M. Lama, of the Hocking Valley, has leased the Elba Mine, below Middleport, and will increase its output.

Cannonsburg, Penn.—Development of virgin coal tracts east of Canonsburg is to follow in the wake of the construction of the Montour and Chartiers Southern railroads. Pittsburgh Coal company will open four large mines as soon as the new roads are completed. Another mine will be located on the Park farm near McPhersons Mill, north of Chartiers Creek and the Chartiers railway.

Indianapolis, Ind.—Contracts have been let by the Big Four Coal Co., with the Roberts & Schaeffer Co., of Chicago, for the construction of five coal plants to be situated at Anderson and Lynn, Ind., Paris and Lilly, Ill., and Dayton, O. The contract price is said to be $50,000. The same company has a contract for the erection of a reinforced concrete coaling station at Chicago, for the Indiana Harbor Belt R.R.

Punxsutawney, Penn.—The Buckingham Coal Co. has recently awarded to the Andrew Lumber Co, of New Bethlehem, a contract for the erection of 20 miners' houses along the J. F. & D. R.R., near Strattonville and Somerville. Five of these dwellings will be erected in Somerville, five about one mile from that town and ten near Strattonville. Work will be started at once and the houses will be rushed to completion.

Connellsville, Penn.—With a view to reducing the cost of living for its employees, the H. C. Frick Coke Co. is making arrangements to establish dairy farms near its coking plant and coal mines. The company will supply its workmen with dairy products at the same price the farmers receive from the wholesale dealers. Similar establishments are being operated by the Pennsylvania-Maryland Coal Co., and the Ebensburg Coal Co.

Des Moines, Iowa—It is understood that a $1,000,000 coal development will soon be started on the new line of the Chicago, Rock Island & Pacific R.R., between Des Moines and Chariton. Four thousand acres of coal rights have been taken up in Lucas County. The deal includes the purchase of the Island Coal Co property, a mine located close to Chariton. The entire field has been prospected and much of it contains valuable deposits. In addition to investments in coal rights, it is planned to spend $200,000 in shaft sinking.

Denver, Colo.—It is reported that a combination of Belgium and Paris capitalists is planning to take over 30,000 acres of valuable coal land in Routt County. A railroad will be built from Hayden, Colo, to Casper, Wyo. Plans of the combination call for the immediate expenditure of $22,000,000 in these two states. It is understood that Denver will be the source of supplies. The company has already been formed and will be known as the Yampa Fuel & Iron Co. It is said that the new railroad will be known as the Colorado & Northern Railway Co.

Whitesburg, Ky.—In pursuance of its announced plans to develop its recently-acquired holdings as rapidly as possible, the Elkhorn Fuel Co. has several hundred men at work in the Boone's Fork section. They are employed in making surveys, laying out towns, building temporary offices, doing grade work, and the like, the whole on a larger scale than anything before done in Eastern Kentucky. The company announces that it has let a contract for the erection of 3000 buildings, including offices, stores, churches, schools, machine shops, supply houses, hotels, Y. M. C. A. buildings, hospitals and residences.

The first town to be built is to be in Potter's Fork, one mile from the main-line of the Lexington & Eastern, and will be reached by a branch from that road. Two others will be built at once, both directly on the Lexington & Eastern one on Wright's Fork and one on Main Boone's Fork. In order that this work may be pushed as rapidly as possible, the present forces will be increased by a thousand men within a short time.

An order has been placed for several million feet of lumber to start the work, pending the installation of two big band-saw mills which will be installed on the ground and manufacture the native timber into the necessary lumber. At the outset the industrial cities of the company will be supplied with electric current from the big power plant of the Consolidation Coal Co., at Jenkins, Ky., ten miles distant. Ultimately, however, the Elkhorn Company will build its own power plant.

NEW INCORPORATIONS

Akron, Ohio—The General Hocking Fuel Co.; capital stock, $50,000; mining coal. Promoter, N. J. Odell.

Boston, Mass.—The Atlantic Coal Co.; capital stock, $500,000. Incorporators: J. B. Sullivan, Jr., and P. D. Dean.

Wilmington, Del.—The Castle-Craig Coal Co.; capital stock, $1,000,000. Incorporators: S. H. Hossecker, T. J. Bohn, Jr., and A. McGarvey.

Anchor, Ohio—The B. C. Tway Mining Co.; capital stock, $10,000; fuel business. Directors: G. A. Linton, H. G. Williamson, W. L. Morris, J. G. Long.

Buffalo, N. Y.—James Ash of Buffalo; coal, coke, ice, lumber; capital stock, $15,000. Incorporators: John G. Cloak, Charles F. Houck, Daniel C. Shearer.

Newport, Ohio—The Licking Coal and Towboat Co.; capital stock, $15,000. Incorporators: Frederick A. Laidley, George P. Quiggin and Walie E. Quiggin.

Camden, N. J.—The Twin Rocks Coal Co.; capital stock, $100,000; to deal in coal, charcoal, etc. Incorporators: A. M. Garrison, J. H. Brooker, and D. C. Mann.

Fairmont, W. Va.—Fairmont & Cleveland Coal Co.; capital stock, $100,000. Incorporators: W. N. Engle, E. L. Henderson, R. Walls, Anthony Cowen and J. R. Burns.

Charleston, W. Va.—The Co-Operative Coal Co.; capital stock, $15,000; to deal in coal lands. Incorporators: T. C. Davis, F. W. Johnson, C. E. McCoy, and R. V. Ramsey.

Camden, N. J.—The Twin Rock Coal Co.; to acquire, purchase, mine and sell coal; capital stock, $100,000. Incorporators: A. M. Garrison, Joseph H. Brooker, C. B. Mason.

Wellsburg, W. Va.—The Ohio River Coal Co.; capital stock, $1000; to mine and deal in coal and other products. Incorporators: H. C. Cochrane, Elmer Haugh, Robert Wheeler, J. K. Capulias and H. A. Stengle.

Wellston, Ohio—The Morrow Prospecting Co.; capital stock, $10,000; drilling and prospecting coal and mineral lands. Incorporators: H. C. Morrow, W. F. Schadel, Jerry Morrow, F. C. Morrow and M. E. Martin.

Charleston, W. Va.—The Miners' Light & Power Co.; capital stock, $250,000; to produce electricity and operate coal mines. Incorporators, J. H. Gaines, A. B. Moontz, G. D. Todd, F. R. Hurlbutt, and R. K. Morton.

Birmingham, Ala.—The Esson Company has filed articles of incorporation for $2000. The concern will mine, buy and sell coal, J. F. Leary is president and treasurer and R. B. Leary is vice-president and secretary.

Sergent, Ky.—The Ross-Petroy Coal Co. is being organized at Hazzard in Perry County, on the new extension of the Lexington & Eastern R.R. The promoters are Alex Ross and

Lois E. Petroy. It is planned to develop the Curt Combs coal land tract.

Huntington, W. Va.—It is reported that a gigantic coal company has been organized to develop coal and timber land in southeastern Kentucky by C C Mayo and a number of his associates. The name of the company has not as yet been announced, nor has any details as to its future policy been given out. It is stated that the operation of the new company will be confined to Kentucky and West Virginia.

INDUSTRIAL NEWS

Beltona, Ala.—The new mine of the American Coal Corporation, at Beltona, has begun operation and it is expected that they will reach a large tonnage in a short while.

Prescott, Ia.—On June 4 cap rock was struck in the prospect hole which was started several months ago, in the hopes of finding a seam of coal. It is estimated that the seam will be 20 in. thick.

Windber, Penn.—John Lochrie has purchased from Berwind-White their large No. 41 mine and has taken over the operation of the plant. Mr. Lochrie owns a 300-acre tract in th area tapped by the mine.

Washington, Penn.—A. W. Pry, of Hickory, has sold his coal and surface to the Chartiers Mining Co. Mr. Pry purchased this farm only a few years ago for about $7000 and received in the neighborhood of $15,000.

Johnstown, Penn.—The Pennsylvania Coal & Coke Corporation has taken over the old Wigton mine near Carrolltown This mine has been closed down for 12 years. The company will attempt its operation in the near future.

Greensburg, Penn.—Former Senator J. M. Jamison has purchased from the Sunshine Coal and Coke Co., three tracts of coal land in Hempfield Township. The consideration is said to have been $72,500, which averages $1000 an acre.

Wilmington, Del.—The Nortonville Coal & Coke Co., a Delaware corporation doing business at Nortonville, Ky., has filed a petition in voluntary bankruptcy in the United States District Court. The position sets forth liabilities of $476,920, with assets of $1638.

Martins Ferry, Ohio—The Glenns Run Coal Co., will employ the stripping method of mining coal from a seam, which comes close to the surface six miles north of this city. This company will remove the surface earth with steam shovels and use the same shovels later for taking out the coal. The seam is from 10 to 30 ft. under ground.

Brazil, Ind.—Crawford & McCrimmon Co., builders of mine machinery, hoisting engines, fans and mine pumps are starting construction of an entire new plant on a nine-acre tract. The buildings will be of the most modern steel fire proof construction. Considerable new machinery equipment is being installed. Practically all contracts have been let.

Torrington, Wyo.—It is known that there is a seam of coal on Horse Creek, and a number of the ranchmen in that locality have a pump and steam engine on the ground, and have dug out considerable coal. This coal is about 18 miles from Torrington and if the quality of the coal and top rock is good, it will probably be developed in the near future.

Ironton, Ohio—The Hecla Coal & Mining Co. has been dissolved in the Court of Common Pleas, June 7, as a result of a suit for dissolution brought by Chas. Campbell and Albert Campbell, both interested in the company. The Hecla Co. was incorporated at $100,000 and owns about 7000 acres in fee simple. Besides this the company has purchased some mineral rights on about 1000 acres more.

Columbus, Ohio—The affairs of the Detroit, Toledo & Ironton R.R. are nearing adjustment. Announcement of a plan looking forward to the reorganization of the Northern & Southern Divisions, after their formal sale on June 26 is made to the New York Trust Co. The latter company is acting in behalf of the holders of the $4,243,000, 4 per cent. general mortgage and divisional first mortgage bonds

Logan, Ohio—The Vinton-Jackson Coal & Mining Co., whose property lies five miles southeast of McArthur, has decided to test the Elk Fork Valley for oil and gas. A J Martindil, their representative, recently signed a contract with the Corts & Botkins Drilling Co. of Lancaster Ohio. to drill several wells into the deep sand a depth of 32,000 feet.

St. Louis, Mo.—The New England National Bank, of Kansas City, has asked that a receiver be appointed for the Farmers Coal Co., a Missouri corporation which owns coal mines in Lafayette County. The petition states that notes by the company amounting to $30,000 are due and unpaid. Furthermore, it is stated that there are first mortgage bonds on the company's property outstanding, aggregating $77,000.

Johnstown, Penn.—J. Blair Kennerly takes over the possession of the Seward Coal Company and the Seward Brick Company, both bankrupt corporations. As a result the creditors of the two concerns will receive about 85 per cent. of their claims. The interests of both properties will be merged under the name of the Nineveh Coal Company, the acquirement of which will cost Mr. Kennerly in excess of $100,000.

Fayetteville, W. Va.—The New River Coal Co., the largest corporation operating in the New River district, held its annual meeting of stockholders at the offices of the company at MacDonald, June 5, and elected a new board of directors. Robert H. Gross was reëlected president and Colonel M. Scott has been reëlected general manager. A number of improvements are contemplated in the different operations, including the acquisition of additional production.

Johnstown, Penn.—Railroad men are greatly interested in the fight in which the Pennsylvania Railroad and the New York Central lines are at present engaged to obtain the right of draining large coal fields in Blair and Cambria Counties, which will be opened within a year or two. The land lies between Dougherty and Dysart, and contains, according to the estimates of mining engineers, 475,000,000 gross tons of coal, or enough to keep 10,000 miners busy for over 10 years. The project is to be financed by eastern capitalists.

Connellsville, Penn.—Efforts to obtain only picked men for work in the Charleroi mine, of the Carnegie Steel Co., will be made when operations are resumed in the summer. All applicants for work, either outside or inside, must convince the management of their sobriety. When ready for operation about 800 men will be employed and the mine will be one of the best equipped along the Monongahela river. It is understood that Geo. W. Wilkies, of Charleroi, will be named mine foreman. As yet, the superintendent has not been chosen.

Birmingham, Ala.—It is understood that the Pratt Consolidated Coal Co. is negotiating for the purchase of the property of the Sayre Mining & Manufacturing Co., which is located in the extreme western part of the county. Two mines are in operation, as well as a large battery of coke ovens. The properties belonging to the Sayre estate are considered among the best in the state. There are several thousands of acres involved and it is said to be valued at $1,000,000. The coal mined by the Sayre Mining & Manufacturing Co. is in steady demand for its coking qualities. It is largely used by the Birmingham Railway Light & Power Co.

Philadelphia, Penn.—The Electric Service Supplies Co. of Philadelphia and Chicago, has placed on the market a trolley ear adapter known as the type RB. This adapter has been very popular in mining work for use in supporting grooved trolley wires after the groove has been badly worn, or the wire twisted due to the fact that the wire is used a number of times and its location frequently changed.

These adapters are used in connection with standard 3 screw, 5-in. clamp ears, and are also used by railway companies for emergency work. They are made for grooved trolley wire of all sizes and for any standard screw clamp ear.

Winchester, Ky.—John, C. M. and Floyd Day, have transferred to a New York syndicate all of their holdings of coal land in eastern Kentucky, for a consideration involving over a million dollars. The property carries with it the Mountain Central R.R., a narrow-gage line 13 miles in length which runs from Campton Junction to Campton. The deal includes a number of stores, mills and other improvements. Considerable of the property, coal and timber lands, is located on the Lexington & Eastern. The Messrs. Day will retain an interest in the new company which will be organized to handle the property, and will have the management of it on the ground.

Whitesburg, Ky.—An Eastern syndicate has just purchased 5000 acres of rich coal lands along Lower Carr's Fork Creek, on the Knott-Letcher border, and is planning the early development of the property, which will necessitate the building of a branch line of railroad out from the Lexington & Eastern seven miles in length. The consideration paid is not known, although it is said to have reached a very large sum, running into several million dollars. The tract in question is almost the last of the large bodies of coal land not taken up, practically all of the known coal territory now being in the hands of companies which intend to develop it.

COAL TRADE REVIEWS

GENERAL REVIEW

The dominant feature of the coal market throughout the entire country is firmness. Generally speaking, there is an active call for practically all grades of coal, with just about enough production to supply the demand and replenish depleted stock in some localities.

Throughout New England some apprehension is felt for Southern coals, and the output is expected to be seriously curtailed within the next three months. Loading at Hampton Roads is slow, due to heavy takings by the Government. All-rail shipments to New England are not as firm as those sent by water.

Anthracite is still slower in shipment than last week, with indications of a good market during July and August. In New York the demand for anthracite is slightly easing up. The mines, however, are operating full force. Some price shading has been done by individuals but not by the larger companies, and the quotations remain unchanged.

Bituminous is a little easier, with no change in price. The better qualities may be had promptly and the lower grades do not appear to be coming to this market. Contract coal is firm, with gas coal active and slack easier.

Throughout eastern Pennsylvania the local demand for anthracite has fallen off, due to the warm weather, but the demand from Tidewater is insistent, and has thus far been but little affected. There is a lively traffic in bituminous and the market is strong. This branch of the industry looks more promising than formerly.

Throughout the Pittsburgh region some small strikes have been experienced, but these are of comparatively little importance. The Lake traffic is heavy, and there exists a congestion of cars en route to Lake Erie, and a car shortage is feared later. The manufacturing demand for coal has fallen off slightly, while coke prices are receding, and many furnaces are not inclined to pay over $2 per ton. In Baltimore, there is a rumor that some operators are storing coal in anticipation of a heavy demand this fall, and the trade continues strong, due to inadequate car and labor supply.

Heavy exportations are taking place from Hampton Roads, and there is less fuel on hand now than for some months. To all appearances this situation will not change unless labor conditions become better.

Throughout the Southern iron-producing districts conditions are about normal. The maximum number of furnaces have been in blast during the year, which has increased the consumption. Throughout Ohio, Michigan and the upper Mississippi Valley generally, the demand for coal is strong for this season of the year. Prices are, however, as a general thing, unchanged. Coke at Detroit is rather dull, and some of the local furnaces have been shut down. At Chicago there exists a good demand for domestic coke, which, to a measure at least, offsets the dullness in the requirements of iron and steel industry.

One of the most important, and perhaps the greatest, stabilizing factor in the present situation is the great amount of coal which is being shipped by way of the Great Lakes. The demand for fuel by the Northwest seems to be remarkably strong, and the coal-producing states lying south and east of these inland waterways are securing the benefit of a stable market at a time of the year when the demand for all grades of coal, particularly that used for domestic purposes, usually experiences a decline.

BOSTON

Bituminous—In some quarters much apprehension is felt over the situation in the coal mining districts in West Virginia. Operators in the Pocahontas and New River fields are advising their factors to go slow on sales, and all apparently expect the output to be subject to material decrease during the next three months. The government is making heavy drafts on the supply at Hampton Roads, and the loading of coastwise tonnage is consequently slow.

Some of the agencies have withdrawn all quotations, even that of $2.85 f.o.b. These conditions have seldom been effective so early in the season, and are usually construed as indicative of strained situations during the balance of the year.

Georges Creek grades are firm with a strong demand for all that comes to tide. Although cars are fairly plentiful, a labor shortage is being seriously felt in this field, and coal is not being mined up to the usual tonnage. Throughout Pennsylvania generally there seems to be a stringency. The better known coals are all practically sold up, that is, as far as the operators care to commit themselves, and there is an increasing tendency to decline orders.

The effect in New England is marked. Already some fair sized purchases have been made of coal from Somerset, Cambria and Clearfield Counties, that will net the mines from 10c. to 15c. more than was the case in April. The plain fact is that good coal is hard to get and prices are harding accordingly.

The present status of all-rail shipments is not quite as firm as for tidewater delivery. It is expected, however, that when inland buyers find their cargoes are not arriving with accustomed regularity there will be a similar bracing up in all-rail shipments.

Current wholesale prices on Bituminous are about as follows: Clearfield coal, $1.05@1.45; Cambria and Somerset, $1.30@1.60. Georges Creek, $1.67@1.77. All the above, f.o.b. mines. Pocahontas and New River coal is firm at Hampton Roads at $2.85. The same grades at Providence bring $3.78@3.83 f.o.b. cars, while at Boston, the price is $3.83@4.

Anthracite—If there is any change in the anthracite market it is in the direction of still slower shipment. Dealers are finding orders for certain kinds and prices rejected for June, and the demand for all grades continues steady. An active market for anthracite is unusual at this time of the year, and the outlook is good for a strong demand in July and August. Such a condition is something new in the hard-coal trade, strike years alone excepted, and some anxiety is felt over the shortage of broken and stove grades. These sizes are much in demand, and the proportion in any one cargo is being held down to the minimum.

PITTSBURGH

Bituminous—Several small strikes have occurred in the Monongahela valley, directed principally against the enforcement of the safety lamp and permissible explosive regulations. These have not amounted to much, however, and labor conditions are fairly satisfactory, as is the car supply. There is considerable congestion of cars enroute to Lake Erie, apparently due to a lack of motive power, and a serious car shortage later in the season is feared by some operators. Manufacturing demand for coal is slightly reduced, in anticipation of inventories, midsummer closings, etc., but on the whole demand continues good. Lake shipments are heavy.

Prompt lots of mine-run and screened coal occasionally bring premiums, while slack is going at 60@70c. for prompt; otherwise regular prices rule as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.45; 1¼-in. steam, $1.50; 1¼-in., domestic, $1.55, per ton f.o.b. mine, Pittsburgh district.

Connellsville Coke—Operators who were committed mentally to the $2.50 price on second-half furnace-coke contracts claim that this is still the asking price, but it is a fact that definite quotations have been made both by such operators and by outside sellers for $2.25, without leading to sales. The furnaces seem now to expect to secure $2 or less, or buy from time to time during the second half. Prompt furnace coke has weakened slightly, the few sales made being usually at $2.10. Foundry coke is off slightly, with only a moderate turnover. We now quote: Prompt furnace, $2.10; contract (asking), $2.25; prompt foundry, $2.85@3; contract foundry, $2.75@3, per ton at ovens.

NEW YORK

As we get further into the summer, the demand for anthracite is easing up, and the larger companies are making prompter shipment on orders than they have at any time since March. However, orders are still to be had and unfilled ones taken care of, so that the production is going along at an almost record rate.

The mines are all working, and it looks as if, even though last June's production was over 6,000,000 tons, this month's output would equal it. As mining was naturally brisk last June, after two months' suspension, this indicates the healthy condition of the market at the present time.

While we understand that some of the individual operators are shading prices on some of the prepared sizes, the larger companies seem to have a market for all they can produce, at full circular, and have not yet found it necessary to stock

prepared sizes, although some pea and buckwheat is being accumulated.

Taking it all in all the market is in a healthy condition, and while it may naturally become a little dull during July and August, the outlook is for a heavy demand for all sizes in the fall.

Prices generally remain unchanged at:

	Circular	Individual	
		Lehigh	Scranton
Broken	$4.70	$4.45@4.65	$4.50@4.70
Egg	4.95	4.90	4.95
Stove	4.95	4.90	4.95
Chestnut	5.15	5.15	5.20
Pea	3.50	3.30@3.45	3.35@3.50
Buckwheat	2.75	2.15@2.45	2.50@2.75
Rice	2.25	1.70@1.95	2.25
Barley	1.75	1.35@1.70	1.60@1.75

Bituminous—The bituminous coal situation appears to be a little easier at this writing than for the last month or six weeks. There has been little or no change in prices for spot delivery, but where it was impossible to secure some of the higher grades of coal with any degree of dispatch, it is now possible to get reasonable amounts of almost any of the higher grades promptly and at a reasonable price.

The lower qualities do not appear to be coming to this market except on orders, and prices are holding fairly firm on these grades. Operators appear to be holding their coal at the mines and are only shipping when they have orders actually in hand. As a result odd lots usually standing at the piers for sale are rather limited in quantity.

Contract prices are still held upon a firm basis, most operators having higher grades of coal being sold out on their full product for the year. Contract inquiries from consumers are rather numerous, but in most cases buyers find plenty of bids on the poorer grades with but few on the better qualities.

Gas coal is still active on Western shipment, very little being available for shipment East. Slack has become a little easier in price and shipments.

PHILADELPHIA

Unusually warm weather has caused a marked falling off in the demand for anthracite. As yet, however, the tidewater tonnage has been little affected. It is understood that the demand from the East still continues good, and with the coal that is going to the lake shipping ports, all the mines are operating to their fullest extent. As a matter of fact, the trade is holding itself together much better than was expected, judging from conditions at the beginning of the present season. All the operators claim that they do not expect there will be any cessation of mining just at present, but do not hold any views as to what conditions are likely to be during July and August.

There are distinct indications that the prediction of a few months ago that the summer would see a lively traffic in bituminous coal will be fulfilled. Car shortage, an immense demand from the Northwest, and an inability to secure sufficient miners, has had a tendency to make the market much stronger, and as the summer advances this condition of affairs is not likely to improve. The demand seems to be on the increase, and should there be any acute car shortage prices would likely take a substantial upward trend. The bituminous trade is in a better condition than it has been for some time, and the indications for the future are propitious.

BUFFALO, N. Y.

The bituminous market is as firm as ever. Dealers report that it is not easy to get a supply of Pittsburgh or Youghiogheny, as these are in such demand for shipment to the lakes. For the same reason the car supply in the Allegheny Valley is deficient. If the cars are needed for loading in the lake trade they are taken, no matter what other needs may happen to be. In a good many cases the mine owner has sold all his present output on contract and is not in the market; this also appears to be the case with the Allegheny Valley and Clearfield situation. At least operators in those districts who live in Buffalo report very much less coal for present sale than used to be the case. Jobbers are not at all anxious to sell slack for 90c. at the mine for any future time as they believe that it will go to $1 and then to $1.50 before next spring. They are, nevertheless, giving instructions to salesmen, to make some 90c. contracts when they have the opportunity. This firm feeling prevails all through this market and is shown by the absence of salesmen in the bituminous trade: a few come in but just to keep in touch with the market. There is not one of them who is anxious to make sales as the consumer comes after them. It looks, moreover, as if such would be the case all the year, unless the crops fail or congress manages to do the wrong thing.

The scarcity of men is becoming more acute so that any increase of output is not to be expected. Some operators do not care to sell another pound of coal until July and others are asking what is to be done when crops are to be moved in the fall or snow comes in winter. Nothing can avert a shortage of bituminous coal but a decided falling off in consumption. There is no difference of opinion here as to that and as a result the asking price is very stiff. If any coal is selling at reduced prices it is poor grade.

The bituminous demand is much more uniform than it often is, which is a good indication that the industries of all sorts are active and hopeful. Buffalo has a strike of teamsters on hand, but it has not caused much trouble. As a rule it is conceded that the men ought to have more pay and many settlements have been made. Bituminous prices are strong, based on $2.80 for Pittsburgh lump, $2.55 for three-quarter, $2.55 for mine-run and $2.15 for slack, with Allegheny Valley about 25c. lower. There is no stir in coke, prices being rather weak on the basis of $4.75 for best Connellsville foundry.

The anthracite trade is slack, with the exception of shipments to the lakes, which is chiefly a matter of moving the coal before winter, whether it is sold or not. Even the rail-line movement is light and local sales are small. Lake shipments for the week were 138,000 tons.

HAMPTON ROADS, VA.

The movement from the Hampton Roads piers has been good, export shipments having been particularly heavy, and the end of the week sees little coal remaining in the railway yards. There is less fuel on hand than there has been for some months, and the prospects are that this shortage will continue unless there is some improvement shortly in the labor situation in the Pocahontas-New River District. Some sales have been made during the week at $2.85 and $2.90, but only for small quantities, as the situation is such that suppliers having coal on hand prefer to hold it for contract business.

The Brazilian warship "Minas Geraes" has taken during the week 2500 tons of bunker coal from barges. This is the largest shipment of bunker coal which has been put into a foreign warship at this port for some time. The coal was from Sewalls Point.

BALTIMORE, MD.

There was no let-up in the heavy demand in the local market during the week; if anything, it was greater than during the previous week. This was particularly true on spot business, quotations in the line trade continuing to show a further stiffening. There is a purchaser for every ton of coal available and even the low grades are readily disposed of at 95c.@$1 per ton.

The heavy demand is still attributed to the restricted production caused by the shortage of labor in the mining region and the scarcity of coal equipment for loading. The shortage of cars in the Eastern markets is ascribed to the heavy shipments in the Lake trade and the slow return of the empties from the loading ports. There are rumors to the effect that some companies are putting considerable coal into storage, in the belief that the heavy demand this fall will place the producer in a position to obtain any price he asks.

The unusually cold weather over the first half of the current month stimulated the hard coal consumption to a slight extent. The coke trade shows little change with the better grades quoted around $2.60 and the supply relatively limited. Dumping of coal at the Baltimore piers has been comparatively active.

COLUMBUS, OHIO

Activity has characterized the coal trade during the past week. Increased demand is reported for lake tonnage, for steam requirements and also for domestic grades. These factors tend to strengthen the trade in every respect and in fact the entire price list is well maintained.

The domestic movement is earlier than usual which is accounted for by the depletion of domestic stocks by the recent flood. At any rate orders are coming in from dealers in all sections, showing their desire to be in a position to take care of consumers earlier than usual. Some of the dealers are placing larger orders for delivery in the months of July and August. The plan on the part of jobbers and operators is to take orders for July shipment at 5c. and for August shipment at 10c. over the present circular.

Steam business is also increasing in volume. Factories generally are demanding more fuel to run their plants and there is some disposition to stock up to guard against a car shortage, which many traffic men predict. At present the situation in this respect is fair although the mines in Eastern Ohio have been crippled to a certain extent by lack of cars. Another trouble in several mining districts is the scarcity of labor.

The lake trade is still booming and no let up is in sight. The Northwest is demanding a large tonnage which the Ohio producers are making every effort to supply. All fields are rushing large shipments to the lakes. The congestion at the upper lake ports is over and there is scarcely any drawback to a free movement of coal from the mines to the docks.

Production in Ohio mines has been larger than formerly. In the Hocking Valley the output has been materially increased and the same is true of the Pomeroy Bend field. In Eastern Ohio, car and labor shortage have combined to keep down the output. In the strictly domestic fields there is a good increase in the tonnage mined.

Reports from the Hocking Valley docks at Toledo for the week ending June 13 shows that 117,000 tons were handled as compared with 108,000 tons for the previous week. Since the opening of navigation the docks have handled 830,000 tons.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50		$1.50	$1.50
2 inch	1.35	$1.25	1.35	1.30
Nut	1.20		1.25	
Mine-run	1.15	1.10	1.15	1.10
Nut, pea and slack	0.60		0.60	0.60
Coarse slack	0.50	0.55	0.50	0.50

BIRMINGHAM, ALA.

Normal conditions obtain in the coal market in this district and in the coast towns supplied by Alabama mines. One feature which has strengthened the local steam market is the fact that a maximum number of blast furnaces have been in operation during the entire year, thereby consuming heavy tonnages of coal for coking purposes.

The car shortage continues, and much uneasiness is felt that no relief is in sight, especially in view of the fact that there is a rate fight on between the state of Alabama and some of the local railroads.

General reports indicate that, but for the car situation, local operators are well pleased with the coal conditions at the present time.

LOUISVILLE, KY.

Conditions in the local market are satisfactory and about normal. Both production and demand are good. Dealers are stocking up, as are also consumers who are beginning to lay in their winter supply.

The weakest branch of the trade at the present time is the steam coal. Shipments of this grade are heavy, particularly from the western Kentucky field, and the demand is not sufficient to absorb all of the arrivals. This is due to the same condition in effect several weeks ago. The strong domestic demand has also resulted in a surplus of nut and slack, so that these grades are not as active as they might be.

There is a heavy demand for eastern Kentucky coal from Chicago and other Northwestern markets, it being stated from authoritative sources that the demand from these points would be 50 per cent. greater than during last season. Judging from current shipments, however, indications are that these will exceed the estimate by nearly double. Operators are hoping that they will be able to hold these markets permanently.

The demand for coal for stocking is becoming steadily stronger especially north of the Ohio river, where there are rush shipments. In eastern Kentucky the Louisville & Nashville R.R. and several other lines have recently restricted their orders, but it is stated on good authority that this is only a temporary condition and that their tonnage requirements will be back to normal in July. Many of the operators in this latter field are practically sold up and out of the market for several months to come. In general, all indications point to an unusual prosperity in the industry for some time to come.

The market is not quotably changed from our previous report, but operators state that an advance of about 10c. per ton will go into effect the first of next month. Shipments to the Southern market will probably cease at about this same time. Operators are favoring the Northern consumer because of the more consistent and year-around demand.

INDIANAPOLIS

Local operators state that while the usual summer quietness prevails, they regard the outlook as good. The crop situation has been interesting them and they find a good wheat yield in prospect, which is the most vital factor among the grains.

Coal men can find no real pessimism among their big customers. The emergency currency order by Secretary McAdoo relieved any money stringency that threatened and the Frisco receivership is looked on as a good thing for the road. Already orders have been given to repair and get in shape the 6000 coal cars of the Chicago & Eastern Illinois, and the road to the coal fields is to be newly ballasted. This is only part of the improvements ordered. Coal men say that when railroads are thus getting ready for business, it is no time for others to be idle.

Some Indiana mines that have been idle are being operated again. On account of the light demand for domestic grades, mines have no trouble to sell screenings, the output of which is mostly under contract. In the open market it is difficult to get anything at 90c., and the price ranges up to $1. Washed coal, which is slowly finding friends, is quoted at $1.25. From the retail yards anthracite and smokeless is moving rapidly into cellars. Coal users, both big and little, are aware that the wheat harvest is on and they are thinking more or less about a probable car shortage. Prices are unchanged at the mines and in the retail yards.

DETROIT, MICH.

Bituminous—The market on certain grades is much stronger than in previous weeks, and indications are that most of the coal is well sold up into August; it looks now as if business for this last month would be considerably ahead of that for either of the two preceding months. Generally speaking, there have been good advances in prices on all grades in this market, and it is now believed that the coming fall will see the maximum quotations ever experienced locally. The movement on contract is heavy, and on domestic grades is in excess of requirements, with the result that these are rather dull. This, however, is usual at this time of the year and has not caused any uneasiness.

The local market is quotable about on the following basis:

	W. Va. Splint	Gas	Hocking	Cambridge	No. 8 Ohio	Pocahontas	Jackson Hill
Domestic lump	$1.40	....	....	....	....	$2.25	$2.00
Egg	1.40	....	....	....	....	2.25	2.00
Steam lump	1.25	....	....	....	....	....	....
¾-in. lump	1.10	$1.10	$1.10	$1.10	$1.10	....	....
Mine-run	0.90	0.90	0.90	0.90	0.90	1.50	....
Slack	0.85	0.35	0.30	0.60	0.60	Open	....

Coke—The local coke market is dull, with the result that some ovens in this vicinity have been compelled to suspend operations for the time being. Connellsville is quoted at $2.75; Semet Solvay, $3; gas house, $2.60; all f.o.b. ovens.

Anthracite—The demand for hard coal is strong, everybody apparently trying to stock up to their utmost capacity; operators are sold ahead for about two months, and premiums are being demanded on both sizes.

CHICAGO

The Chicago market is in a comparatively prosperous condition considering the fact that the usual dull time of the year is supposed to have arrived. Although buying in the spot market is light, the amount of shipments of coal indicates a fair condition of affairs. The light spot market is attributed to the fact that many retail dealers who could have been depended upon to take a large supply of coal for storage did an unusually large amount of buying in April and May, and now have in stock the same amount usually on hand in the latter part of July. Active buying recently in smokeless lump and egg has led to the fixing of the price of that coal for June at $1.90, with producers asking $2.25 for spot shipment. Quite heavy demands for steam coal in spot shipments are being made, and prices range from 80c. for small-sized low-grade screenings coming in at the low freight rate, to 90@95c. for large-sized high-grade screenings coming in on a high freight rate. Contract shipments on steam lump and mine run offsets the inactivity of this coal on the spot market now prevailing. A fairly active domestic coke trade offsets somewhat dull conditions in the iron and steel trade market.

Prevailing prices are:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump	$1.97@2.07		$2.27	
Egg		$2.30@2.40		$4.20
Steam lump	1.82@1.87	2.30@2.40	2.07	3.94
Mine-run	1.77@1.82	2.20@2.30	1.87	3.30
Screenings	1.62@1.67	1.95	1.62@1.67	

Coke—Connellsville and Wise County, $525@5.50; by-product egg and stove, $4.85; by-product nut, $4.55@4.75; gas house, $4.50@4.60.

ST. LOUIS, MO.

A forerunner of what may be expected is seen now in the Standard field in the way of contract prices for the coming season. A month ago operators were hungry for contract business, but they are not so anxious now and are

asking a price that is considered just a trifle unreasonable. The market still continues dull, with the exception of Carterville coal, which is commencing to pick up a little. There is not any great tonnage moving, but a better price is being asked and received, none of this grade being sold for less than $1.10 on the screened sizes. On the other hand, Standard coal is still below the cost of production as 6-in. lump is selling for 80c. and 2-in. lump for 75c.

It is amusing to note in the daily papers about the wonderful advantages that the Keokuk Electric Power Co. will bring to St. Louis. They forget that the Keokuk Power Dam will displace several million tons annually of screenings in the St. Louis market. A few years ago these same screenings were hauled away from the mines as ballast for the railroad companies, and the same thing will likely happen again. This means that the cost of screenings must be added to the screened sizes, and the public will have to foot the bill, so that aside from the business houses of St. Louis the Keokuk Power Dam will increase the fuel bills instead of lessening them.

Anthracite is moving fairly well and so is coke, and on account of the high prices asked for smokeless it is likely that this will lose the hold in St. Louis that it acquired last season.

The prevailing circular is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$0.80@0.85
3-in. lump	.....	.....	$1.20	.....
6-in. lump	$1.15 @ 1.25	.....	1.25	0.85@0.90
Lump and egg	.....	$2.00	1.20	.....
No. 1 nut	1.10 @ 1.20	.....	.....	.....
Screenings	0.80 @ 0.85	.....	.....	0.75@0.80
Mine-run	1.00 @ 1.10	.....	.....	0.75@0.80
No. 1 washed nut		1.40	.....	.....
No. 2 washed nut		1.25	.....	.....
No. 3 washed nut		1.25	.....	.....
No. 4 washed nut		1.20	.....	.....
No. 5 washed nut		1.05	.....	.....

St. Louis prices on May anthracite are: Chestnut, $7.15; stove and egg, $6.90; grate, $6.55. Smokeless lump and egg is $4.65 and mine-run $4. Byproduct coke is $5.10 and gas house $4.85.

PORTLAND, OREGON

Dealers report the coal business dull with little prospect of any heavy movement here for a few weeks. Although the strike in the British Columbia mines affected the market on Puget Sound, to some extent, it has not been felt here in a material way. It is reported, however, that coal is now being brought to the coast from Japan for bunker purposes. Two cargoes are said to be on the way, and others will probably follow unless conditions change soon.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK & WESTERN RY.

The following is a statement of tonnages shipped over this road from mines in West Virginia and the commercial and company coal, for the month of May, in short tons:

Field	Shipped	Tipple	Total	Commercial	Company
Pocahontas	1,257,150	16,941	1,274,091	1,292,130	98,546
Tug River	227,792	2,323	230,115	193,001	37,114
Thacker	258,659	18,350	277,009	186,438	90,571
Kenova	82,496	....	82,496	76,232	6,264
Clinch Valley	.....	....	.....	137,931	13,518
	1,826,097	37,614	1,863,711	1,885,732	246,013

Shipments of coke entirely from the Pocahontas field, were 105,737.

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic over the lines of the C. & O. Ry., for April, and the ten months ending Apr. 30, 1912-13, in short tons:

	March		Nine Months			
Destination	1913	1912	1913	%	1912	%
Tidewater	273,623	533,226	2,993,645	23	3,625,675	24
East	169,265	189,712	2,201,364	17	1,860,988	13
West	435,898	875,602	7,245,245	55	9,137,493	61
Total	878,786	1,598,540	12,440,254		14,624,156	
Coke	28,471	19,992	256,021		190,540	
From connections						
Bituminous	41,571	10,514	536,270	4	184,464	1
Anthracite	2,176	3,215	11,314	1	33,191	1
Grand total	951,004	1,632,261	13,243,859	100	15,032,351	100

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for April, 1912-13, and for the ten months ending April, 1911-12-13, in long tons:

	10 Months			April	
Imports from:	1911	1912	1913	1912	1913
United Kingdom	13,067	6,091	8,550	180	1,099
Canada	1,310,485	850,351	1,181,216	120,767	119,805
Japan	14,200	12,935	66,497	50	23,840
Australia & Tasmania	246,711	162,867	129,985	3,147	12,827
Other countries	4,817	1,944	3,257	443	.....
Total	1,589,280	1,034,188	1,389,505	124,587	157,571
Exports:					
Anthracite	2,424,258	2,659,114	3,701,441	80,654	318,315
Bituminous,					
Canada	6,615,285	8,565,064	9,092,740	577,827	797,126
Panama	432,664	389,643	393,449	59,210	53,190
Mexico	553,505	266,536	350,201	31,043	85,664
Cuba	761,554	918,747	1,035,110	114,653	119,221
West Indies	426,033	577,545	502,891	71,776	46,878
Other countries	517,172	1,145,609	911,299	371,293	169,702
Total	9,306,213	11,863,144	12,285,690	1,225,802	1,271,781
Bunker coal	5,302,750	5,832,031	5,936,461	707,848	559,386

LAKE SHIPMENTS

Anthracite Shipments through the Sault canals for the current year to June 1 were 636,159 tons as compared with 17,848 tons for the same period last year.

Bituminous Shipments for the same periods were: 2,890,789 for the current year as compared with 1,653,922 in 1912 making gross of 3,526,948 for 1913 and 1,670,870 in 1912.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending June 14:

Stocks	Week's Range High	Week's Range Low	Week's Range Last	Year's Range High	Year's Range Low
American Coal Products	87	87	87	87	87
American Coal Products Pref	109¼	109¼	109¼	109¼	109¼
Colorado Fuel & Iron	27¼	24¾	26⅞	41½	24¾
Colorado Fuel & Iron Pref	....	....	155	155	150
Consolidation Coal of Maryland	102¼	102¼	102¼	102¼	102¼
Lehigh Valley Coal Sales	200	180	190	....	....
Island Creek Coal Com	45½	44½	45½	....	....
Island Creek Coal Pref	80½	79½	80½	....	....
Pittsburgh Coal	16	14¾	15½	24⅜	14½
Pittsburgh Coal Pref	76½	73	76½	95	73
Pond Creek	18½	15	17⅜	23¾	15
Reading	157⅞	151⅜	157⅞	168⅜	151⅜
Reading 1st Pref	86	86	86	92½	86
Reading 2nd Pref	86	84	86	95	84
Virginia Iron, Coal & Coke	40	37½	40	54	37½

Bonds	Closing Bid	Closing Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s	93⅜	97	97	May '13	95	99½
Colo. F. & I. gen. 6s	..	..	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	77	81	77½	78	77½	85
Cons. Ind. Coal Me. 1st 5s	..	..	85	June '11	..	..
Cons. Coal 1st and ref. 5s	..	94	93	Oct. '12	..	..
Gr. Riv. Coal & C. 1st g 6s	..	100	102⅜	April '06	..	..
K. & H. C. & C. 1st s f g 5s	..	96	98	Jan. '13	98	98
Pocah. Con. Coll. 1st s f 5s	..	87⅜	86	June '13	86	87½
St. L. Rky. Mt. & Pac. 1st 5s	70	76	76	76	76	80
Tenn. Coal gen. 5s	..	100	100	May '13	100	103
Birm. Div. 1st consol. 6s	100½	103¾	101	April '13	101	103
Tenn. Div. 1st g 6s	..	102	102	Feb. '13	102	102
Cah. C. M. Co. 1st g 6s	..	104	110	Jan. '09	..	..
Utah Fuel 1st g 5s	..	..	..	..	..	..
Victor Fuel 1st s f 5s	..	80	80	May '13	79½	80
Va. I. Coal & Coke 1st g 5s	92	97	92	92	92	98

DIVIDENDS

Ashland Coal & Iron Ry.—Regular quarterly dividend of 1% payable June 20.

Mahoning Coal R.R.—Dividend of $5 payable Aug. 1 to holders of record July 15 on the common stock and $1.25 payable July 1 to holders of record June 20 on the preferred stock.

American Coal Products Co.—Regular quarterly dividend on the common of 1¾% payable July 1 to holders of record June 25. Also regular quarterly on preferred stock of 1¾% payable July 15 to holders of record July 2.

Colorado Fuel & Iron Co.—Dividend of 4% on the preferred payable July 1 to holders of record June 10. Also an additional dividend of 4% payable Jan. 1, 1914, to holders of record June 10, 1913.

Eastern Light & Fuel Co.—Regular quarterly dividend of 2% payable July 1 to holders of record June 19.

FINANCIAL DEPARTMENT

Island Creek Coal Co.

President Holden, of the Island Creek Coal Co., reports for the year of 1912, as follows:

The earnings of all companies for the year have been as follows:

Net earnings from coal and miscellaneous operations, including net profit on sales of lumber		$811,048
Deduct administrative and general expenses		57,252
Total net		753,795
Add interest received on bank deposits, etc		18,693
Total		772,489

The above profits have been appropriated as follows:

Reserve funds for extinguishment and depreciation of coal properties, transportation plants, river and railroad equip. etc	$95,356		
Dividends declared:			
Four dividends on pfd	$298,659		
Two dividends on com	102,552		
Extra dividend of $3 per share on com.	298,728	699,939	795,295
Balance charged against surplus			22,806

The properties have been operated continuously during the year, and produced 2,039,837 tons. Net capital expenditures for the year amounted to $534,522, which have been especially required in the construction of 126 houses and the completion of 38 houses in course of construction on Jan. 1, 1912; the construction of a new hospital and its equipment; new store buildings at mines 7 and 8; a Catholic church and parsonage; new mine equipment, including twelve 6-ton locomotives and two 15-ton locomotives, mining machines, mining cars, etc.; expenditures on account of docks in Superior, Wis.; and especially the construction and equipment of the new dock at Duluth, Minn.

During the year arrangements have been made with the Chesapeake & Ohio Ry. for the operation of our railroad, with the right to have other roads jointly use our railroad, if such joint use seems to us advisable.

On Aug. 1, 1912, was paid the first dividend upon the common stock at the rate of $2 per share per year, and also an extra dividend of $3 per share. At the same time an opportunity was given to the stockholders to reinvest the $3 thus paid in the common stock at $50 per share. In this manner the cash capital of the company was not reduced, but stockholders not desiring thus to reinvest were permitted to receive a portion of the surplus which has already accumulated and for the distribution of which they had so patiently waited.

Consolidated balance sheet for last two years compares as follows:

Assets:	1912	1911
Property account	$5,001,858	$4,467,335
Current assets	1,651,548	1,759,546
Deferred chgs. to operation	22,383	14,831
Total	6,675,789	6,241,714
Liabilities:		
Capital stock	4,779,350	4,480,650
U. S. Coal stock	15,950	17,100
Current liabilities	373,050	247,698
Depreciation and reserves	455,061	420,550
Undiv. surplus subsid. cos.	3,556	4,087
Surplus	1,048,821	1,071,627

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Pond Creek Coal Co.

President A. T. Holden reports for the year ending Dec. 31, 1912, as follows:

Properties—Your company was organized in November, 1911, and has purchased approximately 31,000 acres of coal lands. The surface rights were purchased only when such rights appeared a necessity; the company owns some 5000 acres of surface. We have approximately 26,000 acres of demonstrated coal, a seam of from 5 to 7 ft. in thickness having been shown by openings and drillings throughout a very large percentage of the territory.

On Mar. 11, 1912, the first mine opening was begun and we now have seven mines, the highest present capacity of any one being approximately 200 tons per day, with a prospective ultimate capacity of 1000 tons per day for each. The properties, situated in Pike County, Ky., lie about 10 miles from Williamson, W. Va., a town on the Norfolk & Western R.R. The N. & W. R.R. began in May, 1912, the construction of a railroad from Williamson to our various mines and reached the first mine Nov. 1, 1912, the first shipment of coal being made on that date. At present this branch has a total constructed mileage of about 16 miles. In addition your company has built sidetracks at the various mines.

There had also been constructed on Dec. 31, 310 dwelling houses and machine and blacksmith shops, and there have been purchased mining cars, mining machines, etc. A power plant is sufficiently far advanced so that the company is already operating to some extent by electric power.

Through the selling agency that developed the market for the Island Creek coal, a market has already been developed for the Pond Creek coal, calling for a supply in excess of your company's ability to produce. Many tests have shown that the coal is a valuable byproduct coal.

Shipments—During November your company shipped 11,902 tons of coal; in December, 24,119 tons; in January, 35,142 tons; in February, 28,313 tons. The coal thus shipped is the result of the development work and the mines are not yet, and will not be for some time, upon an operating basis.

Plan—Your directors believe that the property, the railroad facilities and the market all warrant the immediate raising of sufficient money to bring your property up to a 10,000 tons per day basis. The company, Dec. 31, 1912, had on hand $784,619, but most of this was or is immediately required for the equipment and construction already begun. The stockholders are therefore requested to authorize an increase in the capital stock to $3,500,000 by adding 150,000 new shares of $1 each (none of which is to be issued at this time) and $3,000,000 bonds secured by a mortgage, of which only $2,000,000 6% bonds will be issued at present, the remaining $1,000,000 bonds to be retained for future needs. The $2,000,000 bonds, convertible into stock at $25 per share (that is, each $1000 bond convertible into forty shares of capital stock), have been underwritten by Hayden, Stone & Co., subject to your approval, to net the company 94%; that is, $1,880,000. The bonds will be convertible into stock at any time within five years of their issuance and will be callable, upon proper notice, at option of company at 105%. The bonds thus underwritten will be offered to the stockholders at par in the ratio of one bond of $1000 for each 100 shares of capital stock now outstanding; the total outstanding issue of capital stock being 200,000 shares par value $10 each.

The proceeds should suffice to develop the property to a 10,000 tons per day basis and provide working capital, so that the company may much sooner be in a position to pay dividends than if the development were to be accomplished out of earnings.

BALANCE SHEET DEC. 31, 1912 (TOTAL EACH SIDE, $2,536,173).

Real estate	$1,002,182	Capital stock (par $10)	$2,000,000
Construction, etc.	632,518	Share premium account	250,000
Cash	784,619	Accounts payable	252,047
Accounts receivable	39,517	Accrued pay-roll	13,442
Inventories, etc.	77,337	Drafts in transit	18,036
		Funds and reserves	2,648

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Delaware & Hudson Co.

Delaware & Hudson Co. in 1912 earned approximately 12% on $42,500,000 stock. Earnings in 1911 were 12.32% and in 1910 12.54%. Balance for dividends was between $5,000,000 and $5,100,000, against $5,237,680 in 1911 and $5,330,189 in 1910. Notwithstanding the anthracite strike in April and May, when net after taxes fell off more than $950,000, the year closed with only a slight loss in surplus for dividends.

Considering the losses through cessation of mining operation and the increase in maintenance expenditures of about $600,000, the year's record must prove gratifying to stockholders. The decrease in net after taxes amounted to $270,000 for the twelve months. Had the directors wished they could have wiped out the small decrease by checking maintenance work. Instead the company took advantage of the open winter and carried on full maintenance, both of way and equipment, to the end of December. The company expended $435,000 more on maintenance of way in 1912 than in 1911, and $168,000 more on equipment.

Operating revenue increased almost exactly $1,000,000, of which $935,000 was contributed by freight traffic and $45,000 by passenger.

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FINANCIAL NOTES

Union Pacific Coal Co.—The Union Pacific R.R. Co. owns the entire $5,000,000 of the outstanding stock of its subsidiary, the Coal Company. Of the $5,500,000 first mortgage, 5% bonds of the Coal Company, the Railroad Company owns $3,354,000, the remaining $1,646,000 being held as a sinking fund by the Coal Company.

The Reading Co.—The surplus assets of this corporation on June 30, 1912, approached $50,000,000. As a potential factor in whatever financial development the Reading directors may undertake, this exceptionally strong financial position of the concern is of interest. Another feature of this is the fact that none of its obligations mature for a long time to come. Its demands upon its cash assets are more than met with each year's operations.